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AMERICAN
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UNCONDITIONED AND CONDITIONED REACTIONS TO PAIN IN SCHIZOPHRENIA.

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Nearly every text-book of psychiatry mentions that the reaction to pain in catatonics is incomplete or absent. Stransky states in his Text-book of Psychiatry (Leipzig-Voegel) that the response is awkward. It has also been described that when catatonics are stuck in the tongue with a pin they rarely withdraw their tongue, but offer it again and again to this more or less painful procedure. But still the literature contains only occasional remarks and the problem has never been carefully studied. Our interest in this problem has been aroused by a series of cases described by Schilder and Stengel [1, 2] in which the pain reaction of the whole body was more or less incomplete in connection with gross lesions of the brain due to arteriosclerosis, trauma, softening, tumor or syphilis. Many of these cases showed sensory aphasia. Apractic phenomena of a minor degree were not uncommon and in some the postural reflexes were increased. From the clinical symptomatology a lesion in the region of the gyrus supra marginalis seemed probable.

The first of these cases described by Schilder and Stengel came to autopsy (in print) and showed in addition to a small lesion in the frontal lobe, a softening in the gyrus longus insula spreading

[1] Schilder, Paul, and Stengel, Erwin: Schmerzasymbolie, Zeit. f. d. gesamt. Neurol. and Psych. 1928 (113) 130.

[2] Schilder, Paul, and Stengel, Erwin: Der Hirnbefund bei Schmerzasymbolic, Klin. Woch. 1928.

to Heschl's transversal convolution and the adjoining part of the temporal lobe. The process continued into the medullary substance of the gyrus supramarginalis especially in its basal parts and reached also into the gyrus angularis. Two tumor cases, the one studied post mortem, the other by operation, confirmed the localization in the parietal lobe especially in the gyrus supramarginalis. All the cases showed the following characteristic features: The patients did not react at all, or only incompletely, to the pin pricks, blows with hard objects, and the faradic current. Sometimes there was a local reaction by partial withdrawing but never an efficient escape or defense reaction. An expression of pain was often present. Some of the patients offered themselves readily to pain and even inflicted it upon themselves. Their utterances often hinted at some perception of pain but this perception was certainly not adequate and the reaction was by no means purely apractic. The patients reacted also very incompletely to threatening gestures or other dangerous situations.

We have studied a series of catatonic cases in a similar way in order to get a fuller description of the pain reactions of the schizophrenic than has appeared in the literature up to the present. It seemed of especial interest to see if it would be possible to build up a conditioned reflex towards pain in stuporous cases. For this purpose we made use of a very simple apparatus, consisting of a simple induction coil, two dry cells, a small light and two electrodes so placed on a board that the hand rested on them with the palm of the hand touching one and the tips of the fingers the other. After the patient's hand was placed on the electrodes the light was flashed as the signal stimulus, or in unattentive patients, the skin of the forehead was touched. The signal lasted about two seconds and was immediately followed by a strong electric shock, and after several such signals and shocks the signal alone was given or it was followed by the buzzing of the faradic apparatus without the current passing through the electrodes.

Sixteen cases were examined by this method, part of them in the Henry Phipps Psychiatric Clinic and part in the Springfield State Hospital at Sykesville, Maryland.

Before considering the conditioning responses we will give a general description of the reaction of our patients to pain. Patients

in whom catatonic symptoms were not strongly expressed often reacted in a way that was not very different from the normal. Cases with stupor but without marked tension often showed no reaction to pinching, pin pricking and moderate striking with the handle of the percussion hammer, but when the electric current was used they withdrew rather quickly and energetically as in Cases 5 and 6. Patients with marked tensions often reacted to prolonged pinching by squirming of the pinched hand. Sometimes the squirming spread from the hand to the elbow, but rarely to the shoulder. There was usually no general reaction except that sometimes there was some sighing or change in the respiration, or even tears in the eyes, or a stiffening of the body. It was characteristic of all the reactions that the patient never actively attempted to escape or defend themselves. The general response was an expression of attitude rather than an action. The local reaction never led to a real relief of pain. It is remarkable that in some of the cases, as in Case 9, for instance, the sudden strong electric shock each time provoked a quick active withdrawing. The reaction is thus different from the patient's reaction to a prolonged pain, like pinching. In the electric experiments, these reactions were seen clearly in the conditioned and unconditioned reactions. When the hand was pressed against the electrodes, there was squirming which spread only to the next joint and an increased athetoid play of the finger and a tendency of the fingers to crawl away from the electrodes. Gradually there developed a queer, stiff posture of the hand, the fingers stiffly bent in partial flexion in what we will call the arched position. In Case 12 the fingers were so rigidly extended that only the finger tips touched the electrodes, the thumb and little finger being adducted so that a spider-like picture of the hand was produced. If, after several electric shocks, the hand was pressed down on the electrodes by the examiner then the hand alone would fly back, when the pressure was released, either with its distal or proximal part and would remain 2 or 3 centimeters from the plates. There would be a marked resistance in the hand alone to being pressed against the electrodes. Thus the hand is acting like a part separated from the rest of the individual which is not acting at all. In Case 14 the individual fingers acted in a similar way. Thus we have the phenomena of isolation of the different parts of the limbs. It was especially remarkable to what extent the patients, after the shock or discontinua-

tion of the pain stimulus, would return very nearly to their previous positions. This may be due to the tendency of not acknowledging the active movement and the consequent annulment of it. In one case when the electric current was on and no constraint was exerted, the patient returned 16 times for the shock (Case 13). It may be that in some cases the patient seeks the experience of pain again. The submission to the examiner may also play a part. When we summarize we find the following features:

1. The reaction is often retarded and incomplete.
2. The reaction is influenced by the quality and strength of the stimulus.
3. The reaction may be limited to a tonic squirming one.
4. The squirming is usually local, at the most spreading only to the next joint.
5. The phenomena of arching of the hand, spider position of fingers, and rebound of isolated hand or fingers, and increased athetoid movements of fingers are outstanding types of reactions.
6. The reaction may be an expressive stiffness of the whole body.
7. Emotional reactions and changes in breathing may be present.
8. Effective pushing back or escape do not occur in cases with marked motor phenomena.
9. The complete or incomplete return to the disagreeable stimulus is a common feature.

Although a better understanding of these phenomena will be possible in connection with the consideration of the conditioned reaction to pain, we may now say that the most striking feature is that the defense of the individual no longer seems to be integrated. The pain is not appreciated in the sense of the life situation but as a local disagreement or something going on in the bodily sphere. The normal person would perhaps react in a similar way when inflicted by a pain coming from a disease against which defense is not possible. But even so his expressive reactions would be closer connected with his whole personality and would probably be directed more against the pain. Disintegration in the pain reaction of our patients is also evident in that the individual part is acting in an isolated way and that there is less of a reaction of defense than an expression of attitude. The pain reaction is therefore a local and a passive one.

In the discussion of conditioned reactions one must not forget, as Schilder [3] has pointed out, that conditioned reflexes are attitudes of the individual towards a situation which is taken as a whole and which cannot be disintegrated into its single parts. Bechterew [4] emphasized that the attention has some influence on the development of the conditioned reflexes. In the normal subject, the determination to stand the disagreeable stimulus and to show one's own strength plays the most important part. In our patients we cannot expect the same cooperation. It is often necessary to coax the patient into the continuation of the experiment. Even then the signal is often sufficient to break through this superficial and unwilling determination.

The following protocol demonstrates this:

PROTOCOL. CASE 1.—A young married woman of 29, who has shown symptoms of schizophrenic psychoses for several months. She has a haughty withdrawing mannerism and facial expression and either refuses to shake hands or does so very coldly and stiffly. After the first shock she withdraws her hand sharply, rubs it with the other hand and looks at both examiners with a cold smile and said that she didn't think it was necessary to have a shock like that just for fun. She refused to try it again, professing a lack of interest in the experiment. After much urging she did replace her hand reluctantly on the electrode. She withdrew it hastily after the light alone had flashed. She then was very much annoyed and when asked why she withdrew her hand when there was no shock, said with obvious displeasure—"One can have reasons for doing things without explaining everything." She insisted on returning to her ward.

In several other cases the patients could not be induced to repeat the experiment. But it is noteworthy that in one (Case 2) conditioning had already taken place after one shock because a little later the light alone was flashed and the patient appeared frightened and shrank away.

In the following case it is interesting that such a response occurred in a patient that showed an incomplete reaction to the other types of pain:

PROTOCOL. CASE 3.—A young woman of 27 who has been in a state institution for seven years with schizophrenia. At the onset of her psychosis,

[3] Schilder, Paul: Conditioned Reflexes, Arch. of Neur. and Psy. 1929 (22) 425.

[4] Bechterew, W. V.: Die Anwendung der Methode der motorischen Associations reflexe zur Aufdeckung der Simulation, Zeit. f. d. gesamt. Neur. u. Psy. 1912 (13) 183.

when in Phipps Clinic, she had to be constantly guarded because of a persistent tendency to self-mutilation. Now she is uncommunicative, has a very shy, self-conscious attitude, always looks away from the examiner and all her movements are quick and dart-like. When the skin of her forearm was pinched she sometimes did not respond at all or else she showed a quick response which however was neither energetic nor complete. She sometimes would bring the other hand towards the place that was being pinched but never pushed away or she pulled down at her sleeve with quick little inadequate movements. When asked to put her hand on the electrode she started to do so quickly and just as quickly started to pull it away again. She looked away rather than at the light. After the first shock she withdrew her hand sharply and cried out and by no means could be persuaded to replace her hand on the electrodes again.

Case 4 also showed such a reaction, although the other pain responses were of the squirming type. There was also seen a marked dissociation between the local reaction and the general reaction such as is common in many of these patients.

PROCOTOL. CASE 4.—A young woman of 29 who has been in a catatonic stupor for about a year. She was cared for in bed where she was resistive, uncommunicative and spoon-fed. After the first shock she withdrew her hand and cried out and would not permit her hand to be replaced on the electrode. Her resistance was by squirming movements of the arm and stiffening of the body but there were no normal defensive movements from the other hand, nor defensive cries, etc.

PROTOCOL. CASE 5.—A Jewish boy of 24. He has been catatonic for about four years. When studied in Phipps Clinic a year before he showed marked stiffness, mannerisms, etc. In the recent examination he was more flaccid. There was no resistiveness in jaw or neck or any of the muscles and only a slight tendency to catalepsy. There were catatonic pupillary responses, absent deep reflexes, and tendency to reiteration especially of requests given by examiner such as "Sit down," but usually no response to questions. There was a rigid, staring facial expression. After the first shock he withdrew his hand sharply with an exclamatory "Oh," but started to replace it. After five shocks, the local response became less and replacing more complete so that finally he practically left his hand on the plates, but then suddenly jumped up saying in his low, slow, monotonous voice—"I got to go home," and reiterated this several times. After some urging he returned, sitting on the edge of the chair and replacing his hand in an arched position. Through six more shocks, he withdrew very little and diminishingly so, and always replacing, but the arched position of his hand becomes more pronounced. He became more tense and there was a tendency for the hand to crawl off of the electrode so that he missed the shocks. Urging did not persuade him to keep it in place. When asked if it hurt, after a considerable delay he said slowly and monotonously and without expression—"Damn right, it hurts," and then jumped up saying "Goodby," which he reiterated again and again and even

after he was persuaded to sit down and try it some more. Then he was given the signal stimulus (a touch on the forehead) and there was only seen a slight movement of the head. After three more shocks he was given the signal stimulus and the buzzer without the shock. He lifted one finger a little from the electrode but replaced it promptly. Thus he showed less of a local response which tended to diminish and more of an emotional summing up.

PROTOCOL. CASE 6.—A brother to Case 5, age 23, who has been in state institutions with schizophrenia for four years, showing delusion and hallucination, seclusiveness, mutism, refusal of food, constrained attitudes, posturing and grimacing, stereotyping, laughing and talking to himself. During examination he frequently laughed out inappropriately and showed an increase in righting and postural reflexes. When the skin of his forearm was pinched he grimaced in an exaggerated way, but showed no local or defense responses. After the shocks he always showed a marked withdrawal of the hand to the opposite side of the body and sometimes a little exclamation. At first he always replaced the hand himself, later this had to be done for him. After four or five shocks he would not look at the light and even with much urging he would only look at it momentarily and then with much scowling and grimacing. He never showed any unnatural position of the hand and withdrawing was always in a natural way. Because of his inattention to the light he was not conditioned to it but when the signal light and buzzer without a shock were given he withdrew his hand. His response was less of the catatonic and more of an emotional type.

In Case 5 it is of interest that the local reaction of rather natural withdrawal diminished while at the same time he refused to continue with the experiment. That his reactions were rather natural is the more interesting as this patient was examined a year ago by Schilder (in print) and his responses to pain were then of the local and squirming type. But still conditioning was possible in spite of his general attitude. The reaction of his brother (Case 6) is similar except that he did not show the general resistance against the experiment. The result of the conditioning was therefore clearer. It is interesting that he tried to defend himself by not looking at the light.

In the two following cases conditioning developed much more definitely.

PROTOCOL. CASE 7.—A woman of 43 who has been in a state institution for 10 years with a paranoid type of schizophrenia. She shows no unusual mannerisms or behavior but talks continuously of her "water disease" and the "wall people" who talk to her. After the first shock she withdrew her hand and cried out and had to be urged to replace it. She complained that her arm might become paralyzed, but after a little argument agreed to try the other

hand and throughout the experiment shifted back and forth from right to left. After each of six shocks she always withdrew her hand gasping and remonstrating but always immediately replacing the other one. The seventh test was the signal light only, after which she withdrew and jumped a little but laughed at herself and quickly replaced her hand. The experiment continued in this way for some time. She always laughed at herself when she withdrew after the light only and without a shock, making some excuse such as "A miserable feeling makes me do it when I don't really feel anything." "It's a pre-thought," "You cross the bridge before you come to it." Occasionally when there was no stimulus she withdraws her hand when the usual period of time has elapsed. After the experiment had continued for a while she began to cry a little and attempted to hold the reluctant hand on the plate with the other one but she never attempted to get away from the experiment and afterwards expressed the opinion that she felt better and she believed that if she could get used to it, it would make her "water disease" better.

Thus this patient excuses herself when she withdraws without a real shock as the normal subjects of Schilder [8] did. It is of interest that not only the light but the plates and the time were signals and provoked the conditioned response. She showed the same conditioning whether she used the right or the left hand.

PROTOCOL. CASE 8.—A young woman of 23 who for a few months has shown delusions, random and inappropriate speech and an inadequate and inappropriate response to the environment. She at first expressed a lack of interest in the experiment but finally put her hand on the electrodes. After the first shock she withdrew her hand, gasping a little and drawing away with her body as a whole but after some urging she replaced her hand. The light alone was flashed and she withdrew her hand thus showing that she was already conditioned. The response was with the hand alone. The conditioned response occurred a second time but failed a third. After another shock she responded as she did at first and then again gave a local response to the condition stimulus. And after that tended to withdraw her hand as soon as she saw the light and before the shock. Throughout the rest of the experiment she responded only with the hand and always remained conditioned for three or four signal stimuli afterwards. From time to time she interrupted the experiment by quickly unscrewing the four screw caps that connected the apparatus by wires to the plates and throwing them at the examiner saying—"Here are your four screws with four tails making television" (Caps are marked "Tel") and also continually complaining about Johns Hopkins Hospital which she says is "filth and slime." After 25 stimuli (including the signal stimuli when not accompanied by the shock) she began to hold her hand on the electrode in a very stiff position with her fingers over-extended and thus tended to hold them above the one electrode unless watched and urged to keep them in contact. She became more and more reluctant to replace her hand and from time to time shifted to the left.

Once she told the examiner to put his hand on the electrode himself but more often she told him to look at the light himself. For conditioning, either the light alone was adequate, or the light and buzzer, or the mere touch of the electrodes and the lapse of the usual period of time. After the experiment she spoke of every nerve in her body being hit by steel, by Johns Hopkins Hospital, illustrating by tapping her fingers on the table like a Morse code.

This patient had to be coaxed into putting her hand on the electrodes. The first shock had a conditioning effect that lasted an unusually long time. After a greater number of experiments she tried to escape the shock by stiffening of the hand. She, too, shifted from the right hand to the left. Whereas her reaction to the first painful experience was a more general one, later on she reacted only with her hand. Also in this case the mere touch of the electrodes was conditioning. The last two cases show rather clearly that conditioning is dependent upon the general attitude and where a strong determination to expose one's self to the shock is not present the signals provoke the condition reaction very easily. Many different stimuli may then act as a signal, not only the electrodes themselves but even the time.

PROTOCOL. CASE 9.—A woman of 37, who has been under institutional care for 12 years with schizophrenia. She is a small, asthenic woman, contantly distracted by auditory hallucinations, smiling and grimacing to herself and showing some slight athetoid movements in her hands, especially the left. She is cataleptic and shows increased postural and righting reflexes. Her response to pain is very interesting. If she is pricked with a pin there is a slight local withdrawing of the hand but no general response or defense and she continues to smile though she looks away and offers the hand again. If the skin of the forearm is continuously pinched, she does not withdraw at all but looks away and only withdraws the arm after the pinching has ceased. If the knuckles are struck with the handle of the percussion hammer she does not object and each time the little finger rises to anticipate the blow. Again when told to give her right hand so it can be pricked with a large pin held out in preparation, she lifts her left hand a little as though to defend herself but pushes the right in front of it to be stuck. When asked she always admits that she feels the stimulus. With the electrical tests she was very cooperative and again and again replaced her hand on the plates without remonstrating at all, receiving more than 50 shocks. After the first shock there was a slight exclamatory cry of "Oh." This never occurred again. During the first 12 she slightly withdrew her hand and immediately replaced it smiling. After that she was often not attentive to the light and looked away to the right. When remonstrated with about this she frequently insisted that the light had not flashed. On the 22nd stimuli the shock was omitted, only the signal light was flashed, she withdrew her hand incompletely and when this

was repeated on the 27th pointed to the light saying—"It flashed," and usually made a similar comment when the light flashed without a shock. Now, when she is urged to watch the light she seems to be able to do so but the position of her hand has changed. It has taken the arched position and there is a constant playing of the fingers on the electrodes so that no one of them remains in contact for more than an instant. When remonstrated with about this she says—"It does it." When her hand was pressed down on the electrode there was a marked rebound phenomena as soon as the pressure was relieved. Conditioning occurred first as a slight movement in the little finger as soon as she saw the light and before the shock. Soon she becomes strongly conditioned and after a single shock she withdraws 5 or 6 times to the signal light alone, and when the light was no longer sufficient she still responded to the buzzer alone. The condition reaction and withdrawing was never as strong as the real one. She withdrew slower and almost questioningly. Whether the examiner was standing near the apparatus or away from it made a difference in her response. If he was away from it, her hand remained more quietly on the electrodes, when he approached it, the slow incessant playing of the fingers began. If her hand was placed on the bare board of the apparatus, in no way in contact with an electrode, it would lie quietly, but if the light was flashed there was a slight movement in the fingers and then if the buzzer was heard there was a quick withdrawal of the hand from the board and replacement. This recurred five times though the response was less each time and finally did not occur. If the hand was then replaced on the electrodes, the slow playing of the fingers again occurred; she avoided looking at the light and showed a response both to the light and buzzer. Eighteen days later the patient was demonstrated before a clinic. She placed her hand on the electrodes as requested but immediately the athetoid movement of the fingers playing on the electrodes occurred which increased when the examiner stepped over to the apparatus and there was a sharp withdrawal when the light alone was flashed.

In this case we find only a local reaction to pain. To the electric shock she reacted at first generally and later only locally and in an inefficient way. Her tendency to go back to the stimulating plate is rather remarkable. It is seemingly in connection with her general tendency to cooperation and obedience. Her defense consists partly in not looking at the light. In this respect she reminds one of the Case 8 who tells the examiner that he should look at the light. In this case the arching of the hand and associated phenomena plays an increasingly greater part as the experiment proceeds. It is certainly a local conditioning. It finally becomes a local defense reaction. The local conditioned withdrawing is at first a partial one. Besides the arching, the touch of the electrodes brings out an increased athetoid playing with the fingers. It is interesting that after

a while the conditioning becomes very marked. She is even conditioned when she puts her hand on the bare board. Thus it would appear that there has been an incomplete analysis of the whole situation. The situation is less differentiated into its parts than in a normal person. The general reaction in this case does not correspond to the local conditioning. It appears that the return to the electrode is in some way a distrust in her own movements. She undoes her own actions. This is something similar to what one may often see in negativistic cases in which both the position that is given by the examiner and their own movements are annulled. She showed strong conditioning after 18 days.

PROTOCOL. CASE 10.—A young woman of 24, whose illness began 2 years ago with depressive features and delusions of reference. For some months she has been stuporous and mute, retaining saliva, urine and feces, and requiring tube feeding. She was examined four times. She was always uncommunicative, lying stiffly with eyes closed. She showed muscular resistance, especially in the jaw and neck but also in the other muscles. There is also an initial increased resistance to passive extension and some catalepsy.

In the first examination she showed a general response to the first shock in the way of a quick inspiration and quivering movement of head, neck and arm, but did not withdraw. This response diminished with the next three shocks and became limited to a tremor of the fingers on the electrodes. After the fifth shock she showed conditioning by a tremor in the little finger after the signal stimulus (touch on the forehead) before the shock. With the 11th shock the current was increased to maximum. She quickly withdrew her hand with an expiratory cry but immediately put it back. And after the second shock of this sort there was a tendency for the fingers to crawl off of the electrodes as soon as they had touched it again. Subsequently she would hold the tips of her fingers just above the electrode and not keep them in contact until they were pushed down several times. There was a conditioned response to the signal stimulus in the 13th test in which she drew up her little finger but replaced it again quickly. On the 14th a similar stimulus was given to which she failed to respond. After this she did not always replace her hand after a shock but permitted it to stay in position when it was placed there for her.

In the second examination on the next day she withdrew sharply and showed considerable emotional response after the first shock. The second test was the signal stimulus only to which she showed conditioning by withdrawing her hand and increasing her respiration. She received a shock for the third and fourth tests and then showed increasing arched position of the hand and athetoid playing of the fingers on the electrode. She showed slight incomplete withdrawal movements after the 11th and 12th which consisted of the signal stimulus only and in the 18th a quick withdrawal even after the mere lapse of time without any stimulus, and with the 22nd a partial with-

drawal after the signal stimulus alone and a complete withdrawal as a result of a fortuitous noise that occurred a little later.

In the third examination 17 days later she showed a marked response both by withdrawal and by emotional demonstration after the first shock. She at once replaced her hand but as soon as it touched the electrode showed a conditioned response by withdrawing and catching her breath. This recurred four more times, but with diminishing strength. Simply touching the board or any other part of the apparatus did not produce the response. If her hand was pressed against the electrode there was a marked rebound phenomena when the pressure was released. When the forehead was touched there was a pronounced quivering of the whole body and a quick withdrawal of the hand. This was repeated 12 times with a similar response though there was a tendency to delay the response and to withdraw the hand a shorter distance each time. In the 22nd test after the initial shock touching the dorsal surface of the left hand also caused a withdrawal of the right hand from the electrode showing the tendency of spread of the conditioning from the primary point of stimulus to a distal part. This failed the next time, but touching the left cheek resulted in a withdrawing movement of the hand. This failed the next time while touching the forehead still called forth responses several times and when this was exhausted, touching the forehead and buzzer was twice successful in producing the conditioned response. In all 30 conditioned responses occurred after the single initial shock. Then another shock was given and then simply leaning over the patient in preparation to touch her would cause a withdrawal. After the conditioning has been exhausted with this shock it could be reproduced very strongly by the examiner saying "Now I will give you a shock after I have touched you." The withdrawal, which was extreme, occurred only after she was touched. After a third shock it was surprising that the patient at first showed no conditioned responses. However, the examiner had stepped a little away from the apparatus. As soon as he stepped back to the apparatus and put his hand on the button there was a return of strong conditioning. This was in spite of the fact that patient had her eyes closed and appeared to be unobservant. A final shock was given at the end of this examination.

In the fourth examination, three days later than the third, patient was immediately examined for conditioning in lieu of the last shock of the previous examination. She responded strongly to touching of the left hand, cheek, forehead and buzzer and responded in all 35 times. Conditioning was always exhausted first in distal parts, such as the left hand and last to the original signal, touch on forehead and buzzer. But when exhausted in the distal part this could be again reenforced, although more weakly, by once using the original signal.

In this case the same attitude may be observed as in the previous one but her fear of the electrode is sufficiently great to prevent her for awhile from returning all the way back to the electrodes. And she showed a defense reaction when her hand was placed on

the electrodes by the crawling off of her fingers. Next the isolated hand struggled against being put back on the electrodes. In the second series of tests the conditioning appeared much more quickly. Local defense by arching and athetoid movements occurred. In the next series a few shocks had a very strong conditioning effect. Not only the primarily touched part of the skin (forehead) was effective in this way but also the touch of the skin of a remote part of the body (other hand). When the whole situation did not make it probable that the shock would occur the signal stimulus alone did not provoke a reaction. This shows that there was obviously an appreciation of the situation in this seemingly stuporous patient. The conditioning lasted several days. It was stronger from the primarily touched part of the body than from the other parts of the body. When the conditioning from the distal parts was exhausted that from the forehead was still possible. The spreading and non-differentiation in the original area is remarkable and shows a lack of appreciation of this part of the situation. The distal signal may get its conditioning effect back again after the proper signal is once more given. The conditioning effect of the signal can be reenforced by verbal interpretation which therefore must be comprehended by the patient.

The athetoid movements and the arching and the rebound made the experimenting difficult in the cases already mentioned. In Case 11, a young man in a stuporous condition with stiffness in the jaw but without marked stiffness in other parts of the body, this local phenomena made the experiment impossible. After the first shock it became more and more difficult to make his hand stay on the electrode. The hand alone would withdraw and there was athetoid snake-like movements of the fingers and finally the resistance spread to the elbow and he had a frightened look. After nine shocks it was not possible to keep his hands on the plate any more and the experiment was therefore discontinued.

PROTOCOL. CASE 12.—A young man of 30 years, who has been in a catatonic condition with some early tendency to remissions for 13 years; for about five years has been in nearly the same condition. He walked on his tip-toes with a marked tremor of the legs; the arms were flexed at the elbows and the hands held in stiff, contorted position. His neck was extended stiffly back, his shoulders were held high and his face had a rigid mask-like expression. He drooled continuously. He was stiff and cataleptic. His right pupil was smaller than the left and both showed a catatonic light reaction. Pinch-

ing the skin of the forearm called forth no response. In attempting to place his hand on the electrode it was found to be very stiff and to show the rebound phenomena. After a shock he withdrew his hand and replaced it but it became increasingly more stiff and with his fingers held rigidly in a spider-like position until finally it was supported on only one or two upright fingers. It was found that by clamping the thumb under the board the hand could be held in contact with the electrodes but even so he soon managed to hold the hand just above the electrode. After about 20 shocks he showed less and less local response or withdrawal of the hand and more general response in the way that the tremor which was before most marked in the legs now appeared in the arms and hands and he became generally more tense. There was no conditioning to the signal stimulus (touch on the forehead) and the buzzer without the shock after 12 shocks but on the 23rd there was an evident increase in general tension and tremor and again on the 28th, 31st and other subsequent ones.

In this case the marked local reaction is certainly some kind of a conditioning. By clamping the thumb under the board he could be made to suffer the shock. Thus the thumb and the rest of the hand do not act in a coordinated way. The spider-like position of the hand is a new type of defense. This case is one of the few in which local conditioning did not occur. Instead of the local reaction the general stiffening appeared which is probably more of an expression than a defense.

PROTOCOL. CASE 13.—A woman of 58 who has been catatonic since her menopause. She was mute and stiff and showed muscular resistance but no catalepsy. When she was pinched there was no local response but a general complaint, turning her body away from the examiner, turning her head away, showing a distressed facial expression, making little complaining noises and lifting the other hand but making no adequate defense.

After the first shock, she quickly withdrew her hand but partially replaced it showing an expression of distress and slight sounds of distress and tightening of the whole body. In replacing her hand she held it in the arched position and when the light only was flashed she shrank with her whole body a little but did not move her hand. This was after a single shock and occurred a second time also. After another shock, the light alone, again produced the same response. After suffering a shock she first withdrew her hand a very little and returned it, then she cried a little and brought the other hand towards the apparatus drawing her body together, thus after the local response is over, a general response, which, however, is inadequate, is brought into play. The same response is repeated a number of times except that the arching of the hand becomes more pronounced. When the light and buzzer alone were used, there was a general shrinking of the body and contraction of the shoulders but no local response. As the shock was repeated several times, the local response diminished until finally she simply lifted

the tips of her finger a little and replaced them so quickly that she often got a second or even a third shock, at the same time showing a progressive shrinking and drawing together of the body. Then for awhile she did not remove her fingers at all, so that she received a rather prolonged shock each time. At the same time her respiration was increasing and she became more tense. On the 46th stimulus the current was run through the electrodes continuously and she withdrew and immediately replaced her fingers 14 times, each time receiving a shock; she was slower in replacing it the 15th time and then her fingers crept slowly towards the plate until finally touching it the 16th time and then they were held just off the electrode indefinitely and did not change this position when the buzzer stopped.

We have also in this case the arching and the stiffening. The local response gradually became less and less. The tendency to return to the previous position was so great that she got several shocks when the current is kept on for a longer time. One can hardly avoid the opinion that there is some active interest in the pain. Throughout the whole experiment every painful stimulus produced an expressive stiffening as did also the signal stimulus. It was not possible to condition her for a local withdrawing.

PROTOCOL. CASE 14.—A Bohemian woman of about 50 who has been under institutional care for nearly 25 years, most of which time she has been in a catatonic stupor with occasional intervals of excitement. She could walk although very slowly and stiffly, and she showed some cooperation but did not speak. Her hair was worn short and ragged by stereotyped movements of her hand over her head. She was very stiff and tended to remain in cataleptic positions. There was a marked muscular resistance but also some sensitiveness against resistance. There was negativism in the jaw, vasomotor disturbances in the extremities and absence of the deep reflexes. She was examined in two interviews. In the first an effort was made to condition her to the light but she was not sufficiently attentive so the signal stimulus was changed to a touch on the forehead and after 10 or 11 shocks there was evidence of a slight twitching in the thumb or little finger after the signal stimulus alone. Her response to even the strongest current was remarkably slight, a very little withdrawing of the hand which was then immediately replaced. There was never any general response. There was a tendency for the hand to assume the arched position in the course of the experiment and for the fingers to crawl off the edge of the plate, and each time her hand was replaced the fingers were a little nearer the edge of the plate. Two weeks later she showed the same general picture. After the first shock there was a quick withdrawal of her hand but no general response. But then it was difficult to persuade her to keep her hand in contact with the electrodes as she held her fingers just out of contact. If they were pressed down there was a sharp rebound phenomena when the pressure was released. If the pressure is limited to only one finger the rebound phenomena occurred in only this one

finger. Finally, her hand was held against the electrode and the resistance against the examiner's hand was noted. With each shock there was a strong local reaction in an effort to remove the hand but no general response. She tended to over-extend her fingers and her resistance to having her hand held against the electrodes increased in this way, extending only as far as the elbow. On the 15th stimulus there was evidence of increase in resistance in the fingers after the signal stimulus (touch on the forehead) and before the shock. On the 22nd only the signal stimulus was given and she responded with slight resistance in the fingers. After her hand had been held in position for 30 tests she permitted it to remain there without pressure and showed a quick lifting of the fingers after the shock with replacement but after this there was an increased playing of the fingers on the electrode. On the 24th the signal stimulus was given and the buzzer sounded without the shock. There was a slight movement in the hand. Her hand was then held forcibly against the electrodes while the current was kept on continuously. She at first struggled against it in her hand only and showed a slight expression of displeasure in her face. But she soon ceased to struggle and her facial expression became calm and after the pressure was released from her hand she did not remove it from the electrodes but continued to accept the strong electrical stimulus. She showed no response whatever to sharp blows on her knuckles with the handle of the percussion hammer or to pinching the skin of the forearm.

In this case we obtained only the arched position and a slight local response but even so conditioning was possible. In the second series the local rebound phenomena was from the start much stronger but it is of interest that the local resistance disappeared in the course of the experiment. The local conditioning was always incomplete.

PROTOCOL. CASE 15.—A woman of 58 who has been in the state hospital for 32 years in a condition alternating between catatonic stupor and excitement. At the time of examination she was in a stupor without stiffness but some catalepsy. To the shock she responded by a withdrawal of the hand at the elbow but no general response. Arched position and rebound phenomena were developed. She showed conditioning twice after six shocks by a slight movement in the hand after the signal stimulus.

PROTOCOL. CASE 16.—A woman of 28, who has been in a catatonic stupor for four years. As she would not place her hand on the electrodes, the electrodes were pressed against the dorsal surface of the left hand as it was held up in the air, the arm being flexed at the elbow. At first there was no general reaction but only a local contraction of the stimulated muscles. After the 15th there was a slight withdrawal and something like sighing and crying. After about the 20th she showed a conditioned reflex (to touch on the forehead) in the way of a slight withdrawal of the hand and increase in body tension. This also occurred on the 30th, but on the 31st she did not

respond to the touch and sound of the buzzer (without a shock). Thus she showed a very incomplete reaction to pain. There was a slight general sign of discomfort and a slight local reaction. There was a definite careful replacement of the hand whenever it was removed.

These last two cases do not show any particular new features. The conditioning was always incomplete.

In all cases here mentioned conditioned reactions to pain could be provoked if the patients would lend themselves to the experiment. In some of the cases the local defense made the experiment difficult on account of arching and spider-like position of the hand, athetoid movements of the fingers and crawling away from the plates and the rebound phenomena. In Case 16 the general negativistic tendency was a technical obstacle but still conditioning was possible. The arching itself may be considered as a conditioned reaction to the touch of the electrodes which tends to induce the individual to a quick or squirming withdrawal but either the order of the examiner or the determination of the patient keeps the hand back. The arching is therefore the expression of two conflicting tendencies. One of our patients (7) held her one hand down with the other one. In normal persons the same tendency appears either as a stiffening or some action preparatory to the quick withdrawal after the shock has come. The arching is thus rather a complete expression of an ambivalent reaction. The athetoid movement and slow crawling away from the plates belong in the same category.

The conditioned pain reactions were partly local and partly general. In two cases (12 and 13) there was only a general conditioned response. In the Cases 14 and 15, the conditioning reaction was partly a local one. In a special group are the Cases 1-5. They did not show a general reaction of conditioning in the common sense, but a determination not to expose themselves to the shock any more; this played the exclusive part in 2, 3 and 4 and was the most important factor in the departure in 1. In one case (5) a long summation process was necessary before the final resistance against the continuation of the experiment took place. The local reaction was either a complete one as in the Cases 7, 8, 9 and 10, or an incomplete one as in the Cases 14, 15 and 16. The incomplete reaction consisted in lifting one or two fingers. In the Cases 9 and 10, the

incomplete reaction preceded the complete one. In Case 10 this was true of both the general reaction and the local one.

The signal for the conditioned reaction was the original stimulus, the light or the touch on the forehead. But also touching distant points of the skin, the touch of the electrodes and even of the board by the subject's hand and the lapse of time could take the place of the signal stimulus. These facts show again that the stuporous condition and the change in the attitude result in an incomplete analysis of the situation. Cases 7 and 8 were cases of schizophrenic disturbance in thinking, while other cases were stuporous conditions. On the other hand, especially in Case 10 the experiments show an appreciation of some details of the situation one would not have expected. We agree with Bechterew [5] when he says that the method of conditioning patients shows us something about their mental condition which we cannot get by any other method. Refusing to continue the experiment, arching, rebound phenomena, athetoid movements of the fingers, playing about the electrodes are also responses to the situation which are in close relation to the experience of the shock. If it is not a conditioning in the proper sense it is at least the remembrance which is acting and a preparedness to meet the shock. It is remarkable that in the cases of deepest stupor the response becomes a more and more local one. It is as if only a part of the body would react to the anticipated pain. Here our results concerning the actual pain agree with our results concerning the "remembered pain." We point again to the fact that many of our patients show a purely local reaction. It has to be remembered that when the normal individual is exposed more and more often to the stimulus the response becomes more and more a local one. Thus we provoke a reaction more and more dissociated from the whole personality. The same is true in experiments with animals. But in these patients the reaction to the signal belonging to the previous painful situation is still more dissociated from the whole personality than the local reaction of the normal. The reaction was either general and undifferentiated

[5] Bechterew, W. v.: Ueber die Anwendung der associativ motorischen reflexe als objectives Untersuchungs verfahren in der Klinischen Neuropathologie und Psychiatrie. Zeit. f. d. Gesamt. Neurol. and Psych. 1911 (5) 299.

and expressive or local and dissociated. Kempf * emphasizes that such local responses are on a segmental basis. We would rather point to the popular division of the body into hand, arm and elbow for such a response than to the segmental relationship.

From the point of view of the theory of conditioned reflexes our experiments show to what extent complicated psychic attitudes are significant in these responses. Thus these experiments on pathological cases is as revealing as those on normals relative to what is going on during the conditioning.

The problem that interests us most is the problem of the reaction to pain. In Cases 1 to 8 the importance of the general attitude of the individual was clearly seen. They reacted in different ways because they were different personalities with different attitudes to the experiment. In Cases 9 to 16 there was another factor which however was also present in the previous ones, and that was the factor of the dissociation of the motor reaction. It is noteworthy that the latter group belong clinically to the purely catatonic type of picture. There is, of course, the question whether we have to consider these particular reactions only from the point of view of a change in the attitude or whether we have the right to suppose that these different attitudes have also to do with a change in the function of the brain. The resemblance between the above mentioned asymbolia for pain in cortical lesions and the reactions in our catatonics seems to be more than a superficial one. In both we find the dissociation of the defense. Certainly also the brain lesion does not destroy the appreciation of pain and the response to it but provokes only a less integrated perception and reaction. One may point also to the resemblance between the return of our patients to the stimulus and the way in which the organic cases often return to the pain which is perceived but not appreciated in the right way.

It may be that the dissociation in the organic cases is less changeable than in the cases here described, but finally there is enough in common in the two types of disturbances to justify the opinion that also in the catatonic cases the dissociation is in connection with a change in the function of the brain. The clinical facts do

* Kempf, Edward J.: The Autonomic Functions and the Personality. Nervous and Mental Disease Monograph Series No. 28.

not allow us to draw any conclusion as to whether this changed brain function only results from the general psychic attitude which tends to decentralized reactions and to the loss of interest in an action of a rightly integrated and differentiated structure, or whether there are primary changes which coalesce with the changes coming from this general attitude. One might suppose that attitude and primary organic change would either tend in the same direction or the psychic disturbance might even be partly provoked by the change in the integration. It is even impossible to say whether the changes in the attitude towards pain in our cases involve the same apparatus in the brain or only some part which are in more or less close relation to the suggested supramarginal apparatus.

Pain is an important factor in all our life situations. Change in the attitude towards pain indicates either a deep change in the general psychic response or in the apparatus which serves in the integration of attitudes to the life situation.

MODERN TREATMENT OF MENTAL DISORDERS IN GERMAN HOSPITALS.*

By PROFESSOR M. WEYGANDT, Hamburg, Germany.

It is a great honor for me to speak about the conditions of treatment in the mental hospitals in Germany and show you some moving pictures. I am sure that many of these pictures are not very new to you. As I said yesterday, the tendency is the combination of scientific and practical treatment.

In each of our 23 universities, we have a psychiatric clinic. In five hospitals in Germany clinics are connected in combination with the hospital for the insane, such as in Jena, Bonn, Rostock, Göttingen, and also in Hamburg. Our hospital at Hamburg is one of the largest, with 1000 acres, 2000 patients, also 150 nervous cases and psychopathological, juvenile, imbecile and other cases. This is in combination with the university clinic with big laboratories for normal and pathological anatomy, under the direction of Professor Jacob, specialist for brain anatomy, and Professor Kafka, specialist for serology and bacteriology, with the department of causation and genealogy, the department of experimental psychology, etc.

In Germany there have existed for centuries hospitals where insane persons received treatment as well as persons suffering from physical disease, for example, at the Julius Hospital at Wurzburg in Bavaria. There is a hospital at Hamburg called Presthof, opened 300 years ago. These places are principally used for the internment of more excitable and violent patients. It is only about one hundred years since special hospitals for the insane have been created. In this respect, buildings were often taken over which were originally intended for quite other purposes, places such as old castles or convents, factories or prisons.

Special buildings, asylums, were also started at this time. In 1803 the German physician Reil recommended farm houses for mental asylums and urged that the windows should not be barred. Beside somewhat fantastic methods, he anticipated open air life and work in garden and field for mental patients.

* Remarks made at the eighty-sixth annual meeting of The American Psychiatric Association, Washington, D. C., May 6, 7, 8, 9, 1930.

In Hamburg the Friedrichsburg asylum was opened in 1864 in accordance with the principle of no restraint. Here a straight-jacket or a forcing chair has never been employed in the treatment. Very few windows were barred. The more violent cases were placed in cells or single rooms, in the first years of the hospital. Nowadays the principle obtains that mental hospitals should avoid all methods of restraint and should not employ isolation in their treatment. The mental asylum must be a hospital in the full sense of the word, the institution being adapted to the special requirements of psychiatry.

Formerly very large buildings were erected. But 50 years ago it became more usual to employ small pavilions with only one or two floors. Gradually larger buildings were again put up, as the hygienic necessities were better understood and the danger of infection in the asylums is negligible where sanitary conditions prevail.

The mental hospital must make more friendly and compatible impressions than an ordinary hospital, so that the patients, who generally have a repugnance against the asylums, should find everything inviting as they must often spend many years in the asylum, sometimes 50 or 60 years. It is therefore very important to have a park where the patients can find also opportunities to work. Most hospitals in Germany have very nice gardens and parks.

The patients are first driven through the park to the reception pavilion and are then put to bed. The treatment in small rooms for only one patient under the care of an attendant would be too expensive owing to the high costs for such services. Therefore the patients are accommodated in large or small wards. For fresh arrivals or violent cases, rooms with 3 to 10 beds are employed, while harmless, weak and demented patients are put into rooms containing 10 to 20 beds. Attendance must be at hand there day and night.

Very beneficial are the permanent warm baths introduced by Professor Kraepelin, and lasting from 10 to 12 hours, sometimes day and night. These contribute to soothing excitable cases, more especially in the excited state in manic-depressive insanity and also in cases of delirium tremens. Further, the patient's appetite improves. The bath treatment acts as a preventive against decubitus. An advanced case of decubitus is best cured by permanent bath,

especially in cases of general paralysis. Very practical are the porcelain baths with extra thick sides. The patients are put in the bath in their night shirts. Weak patients must lie on a special hammock. Irritation of skin is rare. I have opened in each pavilion for 70 excitable cases 15 of these baths.

Of great practical value in treatment are the lounge chairs arranged as beds in the fresh air. They soothe and improve the appetite and the blood. We often employ them until late in the winter months, November and December.

In Hamburg there are pavilions containing 30 to 100 patients on two floors. The houses for violent patients have two gardens each. These gardens are not enclosed by a wall which would resemble a prison, but they have a ditch 7 feet deep, in which a light wire fence is fixed. Each floor has two wards for bed cases which are without any bars, the upper floors also having none.

For juvenile patients specially psychopathological and feebleminded children, there are gardens close to the house, one being used as a tennis court. A special teacher for the feebleminded gives instruction for these difficult cases. There are also workshops for the children.

Nervous cases are given sun baths. For these there is also an annex for physical treatment, with gymnastic apparatus for active and passive exercises, rowing devices, bicycles, saddles for horse and camel movements. Naturally there are also artificial sun baths, diathermal apparatus with different rays, electric baths, etc.

There are certain methods of treatment which are rather difficult to demonstrate by films, for example, the fever treatment in cases of paralysis and nervous syphilis or operations on the brain. Our film shows the reception of patients, the permanent bed treatment, the baths, artificial feeding, further a punction of spinal marrow and of the brain cistern.

Hypnotic methods are not very often employed, but they are sometimes important in cases of functional disturbance. During and after the war, good results were obtained by hypnotism and suggestion in the cases of trembling neurosis. Also, the functional disturbance of walking could be cured by hypnotic treatment.

Psychoanalysis in general is criticized as of doubtful value in mental cases. I am giving in the films some examples of the effects of hypnotism.

Much more important for the curing of our patients is their employment in some form of useful occupation. For instance, our patients are put to work as tailors, as joiners, as bookbinders, as blacksmiths, as cobblers, as well as at weaving, lace making, mat making, etc.

Cooking for paying patients and those suffering from stomach disorders is done by gas; for the general patients, principally by steam.

The extensive park is tended by patients. A large hot house is used by patients during the winter months. In the park there is a small lake, an artificial hill, and an enclosure for deer.

Very often, generally once a week, concerts and moving pictures are held for the entertainment of harmless patients. The artists work often solely in the interests of humanity. The patients derive great enjoyment from such performances.

Now I want to show you the pictures and give some explanation so you will understand them.

STUDIES OF THE BIOCHEMISTRY OF THE BRAIN BLOOD BY INTERNAL JUGULAR PUNCTURE.*

By ABRAHAM MYERSON, M. D.,

AND

ROY D. HALLORAN, M. D., Boston, Mass.

In 1927 we described a new method for studying the brain metabolism in health and disease by puncture of the internal jugular vein. To this we added a but very little used technique, the puncture of the carotid artery, being thus enabled to investigate the changes that take place in the chemistry of the blood as it enters and leaves the brain. It seemed logical that a study of the blood directly before entering and immediately after leaving the brain, before admixture with the blood from other parts of the body, might give information as to the brain activity within the limits of present biochemical technique. Because of the comparatively brief period of the method used, we limited ourselves chiefly to a demonstration of its safety and practicability. We propose to present at this time some results of our studies in certain mental conditions and without much normal control, not as evidence of pathology, but as a factual presentation of certain phases of brain activity.

Anatomy and Technique.

Between the mastoid tip and the angle and vertical ramus of the jaw the internal jugular vein and internal carotid artery lie in close proximity, the artery mesial to the vein on about the same plane. In this location the internal jugular vein proceeds directly down-

* Read at the eighty-sixth annual meeting of The American Psychiatric Association, Washington, D. C., May 6, 7, 8, 9, 1930.

This research was carried on with the assistance of Drs. William E. Dameshek and Julius Loman. The chemical work was done by Miss Caroline Stephenson. The funds for this research were obtained by a grant from the Commonwealth of Massachusetts, Department of Mental Diseases, Research Division, and we hereby thank Dr. George M. Kline, Commissioner, for his generous assistance in this matter.

ward from the jugular foramen without tributaries and contains unmixed venous blood from the brain. Undoubtedly the blood at this point carries the products of brain metabolism with the exception of those obtained from the cerebro-spinal fluid examination. The internal jugular vein and internal carotid artery continue down the neck in this relation under the anterior border of the sternomastoid muscle to a point slightly below the level of the hyoid bone where the common carotid branches into the internal and external carotid arteries. The pneumogastric nerve lies posterior to the vessels and between them. Other nerves, the 9th and 12th, pass between the vessels. These are apparently pushed aside by the puncture for no evidence of nerve injury has been observed. The walls of the vein and artery show no permanent changes or injuries, as we have observed by open inspection.

Considerable attention has been given to the development of a smooth-working technique. This involves the patient, the operators, and their assistants, the nurse, and the apparatus. Coordination between these factors plays an important part in the success of each procedure.

Every patient is examined while fasting. The same aseptic precautions are followed throughout as in any surgical procedure. The patient lies on his back. The skin of the tip of the ear, jaw, mastoid region and upper neck is iodized. A 2 per cent novocain solution is infiltrated to the depth of about one inch just below the mastoid tip and a more superficial injection is made over the pulsation of the common carotid artery. We have never encountered any evidence of vagus nerve involvement by the anesthetic. The nurse holds the patient's head turned as far as possible toward the shoulder opposite the vessel to be punctured; that is, the patient looks to the left if the right vessels are to be entered and to the right for the use of the left vessels. A 20 c. c. syringe with a No. 19 or No. 20 gauge needle about 1½ inches long attached has been found the most convenient. To prevent clotting, which frequently occurs before the blood can be transferred to a glass collecting tube, a saturated solution of sodium oxalate is dropped into the syringe barrel before the puncture in the proportion of one drop to 5 c. c. of blood. All blood specimens are oxalated except those to be tested for calcium. Because of the necessity of excluding air from the blood for carbon dioxide, oxygen and chloride determinations, 2 or

3 c. c. of paraffin oil are placed in the barrel before the puncture, and the blood obtained is introduced into a glass tube under 8 c. c. of oil, after the usual method for the study of the gases of the blood.

The internal jugular vein is punctured by introducing the needle perpendicularly and with a firm and even thrust slightly below and mesial to the tip of the mastoid process along the anterior margin of the sternomastoid muscle. The common carotid artery is punctured over its pulsation below the level of the hyoid bone. In this procedure the needle is inserted at a slightly acute angle toward the head with the barrel parallel to the course of the vessel. It is possible to enter the internal carotid artery by the same technique used in the case of the jugular puncture by moving the needle about 1 c. c. mesial to the point of entering of the vein and slightly lower on the neck. This puncture is seldom used because it is more difficult and the blood in the common carotid artery is the same in composition as that in the internal carotid. In every instance the needle is usually introduced almost to its entire length and is gradually withdrawn with gentle suction until the blood flows into the barrel. When either the internal or common carotid artery is entered, the blood will pulsate into the syringe, lifting the piston. This characteristic and the color of the arterial blood help to distinguish it from venous.

Several specimens, both oxalated and non-oxalated, may be obtained by quickly exchanging a full syringe for an empty one while the blood is still flowing. We have filled as many as three syringes with a single puncture. Occasionally a slight hematoma forms after the removal of the needle. This may be reduced by making pressure over the point of puncture.

There have been no perceptible reactions to the withdrawal of about 70 c. c. of blood from each of the three vessels used in the initial tests, other than a slight temporary pallor. In over three years' experience no unfavorable reaction to these punctures has occurred. There is not anywhere near the resulting discomfort that there is following lumbar puncture. We believe the technique to be entirely free from danger to the patient, providing the usual aseptic precautions are used. It may be stated that we have punctured many patients on several occasions, often in a period of only a week apart, without any perceptible injuries to the vessel or the patient.

We have compared the blood going to and from the brain with the blood going to and from the arm. The arm was selected as the basis of comparison because it is the basilic vein which is ordinarily used for biochemical studies. Thus, we have been able to make a comparison of the difference in chemical composition of the carotid artery and jugular vein blood and a comparison of the difference in the chemical composition of the brachial artery and basilic vein blood. Thus, brain consumption or contribution of chemical substances might be compared with arm consumption or contribution of the same chemical substances.

Our technique in the time relationship of these four punctures has varied from time to time. We have sometimes taken the two arteries at the same time, followed by the two punctures being made on the two veins at the same time. That is, one operator obtains the blood from the carotid artery, while the other operator obtains it at the same time from the brachial artery. When these bloods have been turned over in the proper way to the chemist, then one operator obtains the internal jugular vein blood, while the other simultaneously obtains the basilic vein blood. This technique carried out perfectly is rather difficult, and we have, in the main, contented ourselves with obtaining first, the blood from the carotid artery and immediately following it, the second operator obtaining the blood from the internal jugular vein; then the blood from the brachial artery is obtained followed by obtaining the blood from the basilic vein. There does not seem to be any difference in results between the two techniques.

We have divided up our cases into those which we call perfect or very good punctures, in which, for example, every vessel was entered in one attempt and no unnecessary manipulation or pain occurred; fair punctures are those in which one or another vessel had to be entered twice but in which there occurred no real delay and the patient was not greatly disturbed; poor punctures are those in which there has been great delay in obtaining blood and in which the patient struggled or was greatly upset by the procedure.

Observations.—Because of the time consuming nature of chemical investigation and because we had a part time organization until very recently, we carried on what we called exploratory examinations of certain factors of blood study, and when we found no

essential difference between the bloods in the brain and the arm regions went on to another investigation.

Thus, we obtained negative results in that there was no essential difference between the blood going to and from the brain and the blood going to and from the arm in the following studies.

A study of the blood of the carotid artery, of the internal jugular vein, of the brachial artery, and of the basilic vein in a small number of cases showed no essential variation in any of these samples, in specific gravity.

Sedimentation rate, studied by the Rourke-Ernstene method showed no difference in the sedimentation rate of the blood of these four vessels. The study of the urea nitrogen content made by the Van Slyke method showed no variation beyond the range of accuracy of the method in the blood of these four vessels. This is also true of the non-protein nitrogen. Non-protein nitrogen, phosphate, calcium, and chlorides showed no significant variations.

Sugar.—Interesting results were obtained in the study of the sugar content of the blood of these four vessels. In order to present the results of this study, we have divided up in the following Tables I, II, III our results in perfect punctures, good punctures. and poor punctures. It will be seen that in the perfect punctures, there is, first, a higher sugar content of the carotid artery blood as compared with the internal jugular vein blood, and likewise the well-known difference in the sugar content of the brachial artery blood and the basilic vein blood. In other words, just as sugar disappears in the transit through the muscles of the arm, so it disappears in the transit through the brain. It will also be seen that by far in the greater number of cases, carotid minus jugular, or what we call brain consumption of sugar although we have no knowledge whatever of what happens to this sugar in the brain, is somewhat greater than brachial minus basilic or arm consumption.

Our work in this respect has been corroborated by an unpublished study made by Dr. William G. Lennox. In the good punctures, so-called, in which more difficulty occurred, this difference is not so striking, and there are more cases in which the arm consumption is as great, though seldom greater, as the brain consumption. In the poor punctures, while it still is definite that there is a brain consumption, the relation between it and the arm consumption is not definite. This leads us to believe that under conditions of

TABLE I.

BLOOD SUGARS. PERFECT PUNCTURES. (MG. PER 100 CC.)

(Folin-Wu Method.)

Patient.	Diagnosis.	Carotid artery (C).	Int. jug. vein (J).	Brachial artery (Br.).	Basilic vein (Ba.).	Simultaneous punctures. C & Br., J & Ba. = +, C & J, Br. & Ba. = −	Brain Cons. (C − J)	Arm Cons. (Br. − Ba.)
J. H.	G. P.	108	96	107	99	+	12	− 8 = 4
B. M.	G. P.	93	85	92	88	+	8	− 4 = 4
J. M.	G. P.	79	70	79	73	+	9	− 6 = 3
H. L. (1).....	G. P.	83	70	84	72	+	13	− 12 = 1
(2).....	G. P.	98	88	94	90	+	10	− 4 = 6
D. S. (1).....	G. P.	90	80	87	82	−	10	− 5 = 5
(2).....	G. P.	100	87	96	87	−	13	− 9 = 4
W. R.	G. P.	109	88	104	97	−	11	− 7 = 4
B. M.	G. P.	103	85	94	89	−	18	− 5 = 13
W. J.	G. P.	80	67	78	72	−	13	− 6 = 7
H. C.	G. P.	96	84	96	90	−	12	− 6 = 6
W. H.	G. P.*	213	189	199	186	+	24	− 13 = 11
W. T. (2)....	G. P.	...	83	98	90	+	11	− 6 = 5
T. M. (2)....	G. P.	88	74	87	80	+	14	− 7 = 7
S. S. (1)....	D. P.	104	77	103	85	+	27	− 18 = 9
S. McD.	D. P.	108	84	100	93	+	24	− 7 = 17
H. K.	D. P.	105	93	105	98	+	12	− 7 = 5
W. F.	D. P.	97	76	96	82	+	21	− 14 = 7
N. C.	D. P.	75	67	76	70	+	8	− 6 = 2
C. M.	D. P.	90	77	91	85	−	13	− 6 = 7
W. K. (1)....	D. P.	127	106	121	109	−	21	− 12 = 9
(2)....	D. P.	102	88	100	89	−	14	− 11 = 3
H. H. (1)....	D. P.	85	79	82	80	−	6	− 2 = 4
(2)....	D. P.	...	99	103	100	−		
W. H.	D. P.	84	79	83	73	−	5	− 10 = − 5
F. E.	D. P.	77	66	76	72	−	11	− 4 = 7
M. D.	D. P.	91	76	85	79	−	15	− 6 = 9
H. B.	D. P.	100	77	86	81	−	23	− 5 = 18
R. A.	D. P.	82	68	78	72	−	14	− 6 = 8
J. A. (1).....	D. P.	89	75	83	77	−	14	− 6 = 8
(2).....	D. P.	88	79	89	84	−	9	− 5 = 4
H. C. (fem.).	D. P.	87	76	85	79	+	9	− 6 = 3
A. B. (fem.).	D. P.	84	74	82	75	+	10	− 7 = 3
T. H. (2).....	D. P.	85	76	84	79	+	9	− 5 = 4
T. O'B. (2)...	D. P.	94	85	95	89	+	9	− 6 = 3
I. S. (fem.)..	D. P.	83	76	83	79	+	7	− 4 = 3
D. Z. (fem.)..	D. P.	85	74	85	81	+	9	− 4 = 5
H. B.	D. P.	95	85	94	89	+	10	− 5 = 5
E. B.	D. P.	92	80	92	84	+	12	− 8 = 4
W. K.	D. P.	96	79	...	90	+		
M. Mc.	D. P.	...	107	117	113	+		
S. S.	D. P.	...	79	91	83	+		
T. M.	D. P.	...	74	89	77	+		
H. B.	D. P.	...	75	90	83	+		
T. O'B.	D. P.	...	77	87	83	+		
W. B.	D. P.	...	84	86	80	+		

* Diabetic.
Cons. = Consumption.

TABLE II.

BLOOD SUGARS. FAIR PUNCTURES. (MG. PER 100 CC.)

(Folin-Wu Method.)

Patient.	Diagnosis.	Carotid artery (C).	Int. jug. vein (J).	Brachial artery (Br.).	Basilic vein (Ba.).	Simultaneous punctures. C & Br., J & Ba. = +| C & J, Br. & Ba. = —	Brain Cons. — Arm Cons. (C—J)—(Br.—Ba.)
W. T. (1).....	G. P.	98	84	100	89 2P.	—	14 — 11 = 3
F. M.	G. P.	90	76	86	80	—	14 — 6 = 8
W. M.	G. P.	83 2P.	74	80	76	—	9 — 4 = 5
R. F.	G. P.	85	75	84 2P.	77	—	10 — 7 = 3
W. B. (1).....	G. P.	99 2P.	90	94	90	—	9 — 4 = 5
(2).....	G. P.	.....	78	80	84	+	
R. R.	G. P.	87 3P.	74	87 2P.	80	—	13 — 7 = 6
T. M. (1).....	G. P.	83	70	76 2P.	75	—	13 — 1 = 12
L. B.	G. P.	104	91	104 2P.	96	—	13 — 8 = 5
I. McL.	G. P.	85	74	82 2P.	79	—	11 — 3 = 8
E. W.	D. P.	95	64	91 3P.	68	+	35 — 23 = 12
T. O'B. (1)...	D. P.	94	85 3P.	90	88	+	9 — 2 = 7
A. F. (1).....	D. P.	92	74 3P.	93	79	+	18 — 14 = 4
(2).....	D. P.	89	81	89	79	+	8 — 10 = — 2
I. McG.	D. P.	95	73 3P.	96	80	+	22 — 16 = 6
W. F.	D. P.	83	76 3P.	80	74	+	7 — 6 = 1
D. F. (1).....	D. P.	85	75 3P.	82	69	+	10 — 13 = — 3
(2).....	D. P.	95	84 2P.	92	84	—	11 — 8 = 3
(3).....	D. P.	81 3P.	68	78	73	—	13 — 5 = 8
R. B. (1).....	D. P.	115	93	112	92 2P.	+	22 — 20 = 2
(2).....	D. P.	109	101	108	105 2P.	—	8 — 3 = 5
F. H.	D. P.	86	74	86 2P.	84	—	12 — 2 = 10
T. C.	D. P.	86 3P.	79	85	82	—	7 — 3 = 4
M. D. (1).....	D. P.	94 2P.	84	94 2P.	85	—	10 — 9 = 1
(2).....	D. P.	92	75 3P.	93	79	—	17 — 14 = 3
(3).....	D. P.	92	75 3P.	93	79	—	17 — 14 = 3
R. S. (1).....	D. P.	78 3P.	73 2P.	78	74	—	5 — 4 = 1
(2).....	D. P.	97 2P.	85	100	87	—	12 — 13 = — 1
H. B.	D. P.	105	91	105 2P.	92 2P.	—	14 — 13 = 1
M. McL.	D. P.	98	91 3P.	97	92	—	7 — 5 = 2
E. B. (1).....	D. P.	97	87 2P.	95	89	—	10 — 6 = 4
(2).....	D. P.	.....	80	84	83 2P.	+	
M. G.	D. P.	92 2P.	86 2P.	89	83	—	6 — 6 = 0
S. S. (2).....	D. P.	.....	81 2P.	87	84	+	

P. = Punctures.

TABLE III.

BLOOD SUGARS. POOR PUNCTURES. (MG. PER 100 CC.)

(Folin-Wu Method.)

Patient.	Diagnosis.	Carotid artery (C).	Int. jug. vein (J).	Brachial artery (Br.).	Basilic vein (Ba.).	Simultaneous punctures. C & Br., J & Ba. C & J, Br. & Ba. (+ / = =)	Brain Cons. — Arm Cons. (C—J)—(Br.—Ba.)
W. M.	G. P.	97 2P.	81	98 Di.	81	+	16 — 17 = — 1
J. M.	G. P.	103 3P.	75	109 3P.	82 2P.	+	28 — 27 = 1
G. F.	G. P.	100	91	105 Di.	93	+	9 — 12 = — 3
M. H.	G. P.	96	88	98 3P.	99 15M.L.	+	8 — 1 = 7
W. B.	G. P.	80 2P.	68	81 3P.	77 2P.	—	12 — 4 = 8
H. C.	G. P.	85 3P.	68	83 3P.	68 2P.	—	17 — 15 = 2
R. B.	G. P.	89 3P.	78	82 3P.	78 3P.	—	11 — 4 = 7
R. R.	G. P.	94 4P.	92 3P.	92 3P.	83 3P.	—	2 — 9 = — 7
J. O.	G. P.	88 15M.L.	72	84	78 5M.L.	—	16 — 6 = 10
A. DeA. ..	G. P.	235	227	235 2P.	250 Di.	—	8 — 15 = — 7
M. D.	D. P.	92	75 3P.	93	79	+	17 — 14 = 3
W. G.	D. P.	96	76	114 Di.	82	+	20 — 32 = — 12
A. McN. ..	D. P.	106	83 4P.	98 4P.	83	+	23 — 15 = 8
T. H. (1).	D. P.	.....	67 2P.	80 3P.	72 2P.		
A. Fr.	D. P.	.....	70 2P.	79 2P.	74 2P.		
W. K.	D. P.	102 2P.	88 2P.	100 2P.	89 2P.	—	14 — 11 = 3

P. = Punctures.
Di. = Difficult.
M.L. = Minutes later.

TABLE IV.

BLOOD SUGARS (MG. PER 100 CC.) OF 5 EPILEPTICS.

(Folin-Wu Method.)

Patient.	Diagnosis.	Carotid artery (C).	Internal jugular vein (J).	Brachial artery (Br.).	Basilic vein (Ba.).
J. C. (1).....	Epileptic, clouded state.	110	100	.....	100
J. C. (2).....	Epileptic, clear state....	110	80	.....	94
H. C.	Epileptic	98	73	.....	89
Kev.	Epileptic	90	84	.....	89
Wal.	Epileptic	93	81	.....	90

perfect technique, in the main, or at least in the types of cases we studied and in those cases studied by Dr. Lennox, what we call brain consumption of sugar is greater than that of arm consumption. Of course, there are factors which we have not been able to study, such as the rate of brain blood circulation and so forth.

TABLE V.

BLOOD SUGARS OF 4 NORMALS (INTERNAL JUGULAR VEIN AND BASILIC VEIN SIMULTANEOUSLY PUNCTURED). (MG. PER 100 CC.)

(Folin-Wu Method.)

Patient.	Diagnosis.	Carotid artery (C).	Internal jugular vein (J).	Brachial artery (Br.).	Basilic vein (Ba.).
D. S.	Normal	105	91	.....	105
J. F.	Normal	112	97	.....	104
W. N.	Normal	104	71	.....	84
G. D.	Normal	94	83	.....	90

We have only recently started a study of the gaseous content of the brain, namely, the oxygen content, CO_2 content, oxygen saturation, and oxygen capacity. We have used the improved Van Slyke method for this study and have been, we believe, faithful in every step of the technique from the obtaining of the blood under air-free conditions to the details of the chemical technique itself.

Table VI shows first, that oxygen disappears in the transit through the brain as it disappears in the transit through the arm; second, that CO_2 is increased by the transit through the brain as it is increased by the transit through the arm. In other words, in relationship to the use of oxygen and the formation of CO_2, the brain behaves as would be expected, and as all living tissues do, though this has not been demonstrable. The chemical activity of the brain in gaseous consumption and production is essentially similar to that of the arm. In some of our cases there is a striking difference, which we cannot explain, between the brain consumption of oxygen and production of CO_2 and the arm consumption and production of oxygen and CO_2. In some cases the brain uses more oxygen and produces more CO_2; in others, the condition is reversed. The cases are too few in number to be more than chance differences. It will be noted in these tables that the sugar utilization follows the rule

TABLE VI.

Blood Carbon Dioxides, Oxygens, and Sugars.

(Van Slyke Method.)

Sugars = Mg. per 100 cc.
CO_2, O_2 = %
Sugar lowest, CO_2 highest, O_2 sat. lowest } = italics

Normals (fasting) = Sugar cont. Art. 80-110 Ven. 70-100; CO_2 cont. Art. 40-50% Ven. 50-60%; O_2 sat. Art. 94-98% Ven. 65-80%

Patient.	Diagnosis.	Test.	Carotid artery.	Brachial artery.	Int. jug. vein.	Basilic vein.	Remarks.
W. G.	D. P.	Sugar	....	....	....	....	Patient quiet, good punctures.
		CO_2 cont.	47.46	47.51	*57.41*	55.41	CO_2 cont. normal.
		O_2 cont.	17.81	18.05	*13.05*	14.71	O_2 sat. low in arterial blood, normal in basilic vein, low in jugular.
		O_2 cap.	22.08	22.08	22.08	22.08	
		O_2 sat.	81.00	81.00	*58.00*	66.00	
A. B.	D. P.	Sugar	84.00	82.00	*74.00*	75.00	Patient quiet, good punctures.
		CO_2 cont.	48.40	48.57	*54.68*	53.08	CO_2 cont. normal.
		O_2 cont.	18.43	18.13	*12.75*	*12.87*	O_2 sat. slightly low.
		O_2 cap.	19.99	19.99	19.99	19.99	
		O_2 sat.	91.00	91.00	*63.00*	*63.00*	
H. C.	D. P.	Sugar	87.00	85.00	*76.00*	89.00	Patient excited, good punctures.
		CO_2 cont.	51.23	51.05	*58.97*	54.63	CO_2 cont. normal.
		O_2 cont.	12.01	11.96	*8.07*	10.17	O_2 sat. low in all but basilic vein.
		O_2 cap.	14.17	14.17	14.17	14.17	
		O_2 sat.	84.00	84.00	*56.00*	71.00	O_2 cap. low throughout.
D. Z.	D. P.	Sugar	85.00	85.00	*74.00*	81.00	Patient quiet, good punctures.
		CO_2 cont.	43.64	42.98	*49.75*	46.20	CO_2 cont. low in basilic vein normal in others.
		O_2 cont.	18.66	18.01	*13.74*	15.10	
		O_2 cap.	21.02	21.02	21.02	21.02	O_2 sat. low in arterial blood normal in venous blood.
		O_2 sat.	88.00	85.00	*65.00*	71.00	
H. B.	D. P.	Sugar	95.00	94.00	*84.00*	89.00	Patient quiet, good punctures.
		CO_2 cont.	53.85	53.95	*62.83*	58.45	CO_2 cont. normal.
		O_2 cont.	20.49	20.52	*13.28*	17.24	O_2 sat. normal in all but jugular vein.
		O_2 cap.	21.79	21.79	21.79	21.79	
		O_2 sat.	94.00	94.00	*61.00*	79.00	
H. B. 2.....	D. P.	Sugar	....	94.00	*85.00*	86.00	Patient quiet, good punctures.
		CO_2 cont.				*58.38*	CO_2 cont. normal.

		O_2 cap.	21.79	21.79	21.79	21.79	lar vein.
		O_2 sat.	94.00	61.00	72.00		
H. B. 2.....	D. P.	Sugar	....	94.00	*85.00*	86.00	Patient quiet, good punctures.
		CO_2 cont.	....	49.90	*59.10*	58.38	CO_2 cont. normal.
		O_2 cont.	....	19.91	*11.33*	11.95	O_2 sat. normal in arterial blood, low in venous.
		O_2 cap.	....	20.49	20.49	20.49	
		O_2 sat.	....	97.00	*55.00*	58.00	
W. K.	D. P.	Sugar	....	96.00	*77.00*	90.00	Patient quiet, good punctures.
		CO_2 cont.	....	49.65	*56.02*	54.44	CO_2 cont. normal.
		O_2 cont.	....	19.12	*11.24*	12.20	O_2 sat. normal in arterial low.
		O_2 cap.	....	19.38	19.38	19.38	O_2 cap. low throughout, venous.
		O_2 sat.	....	98.00	*57.00*	63.00	
M. McL. ...	D. P.	Sugar	....	117.00	*107.00*	113.00	Patient quiet, good punctures.
		CO_2 cont.	....	45.96	*52.56*	49.53	CO_2 cont. normal.
		O_2 cont.	....	19.20	*12.01*	17.23	O_2 sat. normal.
		O_2 cap.	....	19.47	19.47	19.47	O_2 cap. low throughout.
		O_2 sat.	....	98.00	*62.00*	88.00	
S. S.	D. P.	Sugar	....	87.00	*81.00*	84.00	Patient quiet, good punctures.
		CO_2 cont.	....	42.69	*54.12*	50.01	CO_2 cont. normal.
		O_2 cont.	....	19.92	*10.47*	11.79	O_2 sat. normal in arterial blood, low in venous.
		O_2 cap.	....	20.28	20.28	20.28	
		O_2 sat.	....	98.00	*51.00*	58.00	
T. M.	G. P.	Sugar	....	87.00	*74.00*	80.00	Patient quiet, good punctures.
		CO_2 cont.	....	46.93	*56.30*	52.82	CO_2 cont. normal.
		O_2 cont.	....	18.24	*11.37*	*11.59*	O_2 sat. slightly low.
		O_2 cap.	....	19.82	19.82	19.82	O_2 cap. slightly low.
		O_2 sat.	....	92.00	*57.00*	*58.00*	
H. B.	D. P.	Sugar	....	105.00	*91.00*	92.00	Patient quiet, good punctures.
		CO_2 cont.	....	49.93	*58.61*	54.07	CO_2 cont. normal.
		O_2 cont.	....	18.39	*11.29*	14.90	O_2 sat. low in all but basilic vein.
		O_2 cap.	....	20.49	20.49	20.49	
		O_2 sat.	....	89.00	*54.00*	72.00	

Sugar = Mg. per 100 cc.
CO_2, O_2 = %
Sugar lowest
CO_2 highest
O_2 sat. lowest
} = italics

TABLE VI.—CONTINUED.

BLOOD CARBON DIOXIDE, OXYGENS, AND SUGARS.

(Van Slyke Method.)

Normals (fasting) = Sugar cont. Art. 80-100 Ven. 70-100; CO_2 cont. Art. 40-50% Ven. 50-60%; O_2 sat. Art. 94-98% Ven. 65-80%

Patient.	Diagnosis.	Test.	Carotid artery.	Brachial artery.	Int. jug. vein.	Basilic vein.	Remarks.
A. F.	D. P.	Sugar	....	79.00	*70.00*	74.00	Patient quiet, good punctures.
		CO_2 cont.	....	52.63	56.39	*56.94*	CO_2 cont. normal.
		O_2 cont.	....	11.57	*10.00*	10.79	O_2 sat. normal in all but arterial blood.
		O_2 cap.	....	16.14	16.14	16.14	
		O_2 sat.	....	71.00	*61.00*	67.00	O_2 cap. low throughout.
T. H.	D. P.	CO_2 cont.	56.27	56.20	....	*62.48*	Patient quiet, jugular punctures unsuccessful.
		O_2 cont.	17.75	17.60	....	*14.15*	
		O_2 cap.	*21.22*	*21.22*	....	*21.22*	CO_2 cont. increased.
		O_2 sat.	84.00	83.00	....	*66.00*	O_2 sat. low in arterial blood.
W. B.	G. P.	Sugar	....	86.00	84.00	*80.00*	Patient quiet, good punctures.
		CO_2 cont.	....	49.28	*55.22*	52.14	CO_2 cont. normal.
		O_2 cont.	....	15.63	*10.27*	12.94	O_2 sat. low in all but basilic vein.
		O_2 cap.	....	17.41	17.41	17.41	
		O_2 sat.	....	90.00	*59.00*	74.00	O_2 cap. low throughout.
E. B.	D. P.	Sugar	92.00	92.00	*80.00*	84.00	Patient quiet, good punctures.
		CO_2 cont.	52.06	51.86	*57.02*	*57.02*	CO_2 cont. normal.
		O_2 cont.	18.71	18.81	*13.22*	15.45	O_2 sat. low in all but basilic vein.
		O_2 cap.	22.41	22.41	22.41	22.41	
		O_2 sat.	82.00	83.00	*58.00*	69.00	
I. S.	D. P.	Sugar	....	83.00	*76.00*	79.00	Patient excited, good punctures.
		CO_2 cont.	....	55.65	61.62	57.41	CO_2 cont. slightly high in all but basilic vein.
		O_2 cont.	....	13.13	*7.72*	9.71	
		O_2 cap.	....	16.54	16.54	16.54	O_2 sat. low.
		O_2 sat.	....	79.00	*46.00*	59.00	O_2 cap. low throughout.
W. B.	D. P.	Sugar	....	84.00	*78.00*	80.00	Patient quiet, good punctures.

		O_2 sat.	....	79.00	*46.00*	59.00	O_2 cap. low throughout.
W. B.	D. P.	Sugar	....	84.00	*78.00*	80.00	Patient quiet, good punctures.
		CO_2 cont.	....	50.43	54.38	*57.45*	CO_2 cont. normal.
		O_2 cont.	....	16.02	12.68	*7.43*	O_2 sat. low.
		O_2 cap.	....	19.54	19.54	19.54	O_2 cap. low throughout.
		O_2 sat.	....	81.00	64.00	*38.00*	
H. H.	D. P.	Sugar	....	103.00	*99.00*	100.00	Patient quiet, good punctures.
		CO_2 cont.	....	51.17	*56.09*	*56.35*	CO_2 cont. normal.
		O_2 cont.	....	21.27	*17.74*	*17.69*	O_2 sat. normal.
		O_2 cap.	....	22.78	22.78	22.78	
		O_2 sat.	....	93.00	*78.00*	*78.00*	
A. F.	D. P.	Sugar	....	79.00	*70.00*	74.00	Patient quiet, good punctures.
		CO_2 cont.	....	49.01	52.73	*54.04*	CO_2 cont. normal.
		O_2 cont.	....	16.40	10.77	*7.45*	O_2 sat. very low.
		O_2 cap.	....	21.66	21.66	21.66	
		O_2 sat.	....	76.00	49.00	*35.00*	
S. McD. ...	D. P.	Sugar	....	....	....	....	Patient quiet, good punctures.
		CO_2 cont.	....	50.53	55.09	*56.92*	CO_2 cont. normal.
		O_2 cont.	....	16.76	12.72	*9.95*	O_2 sat. low.
		O_2 cap.	....	20.43	20.43	20.43	
		O_2 sat.	....	82.00	62.00	*49.00*	
J. A.	D. P.	Sugar	....	89.00	*79.00*	84.00	Patient quiet, good punctures.
		CO_2 cont.	....	49.39	*56.85*	51.76	CO_2 cont. normal.
		O_2 cont.	....	17.21	*12.26*	14.15	O_2 sat. low in all but basilic vein.
		O_2 cap.	....	20.38	20.38	20.38	
		O_2 sat.	....	85.00	*60.00*	69.00	
R. S.	D. P.	Sugar	....	100.00	*85.00*	87.00	Patient quiet, good punctures.
		CO_2 cont.	....	46.10	*55.14*	52.04	CO_2 cont. normal.
		O_2 cont.	....	17.24	*12.01*	14.24	O_2 sat. normal.
		O_2 cap.	....	17.77	17.77	17.77	O_2 cap. low throughout.
		O_2 sat.	....	97.00	*68.00*	80.00	

that the brain uses up more sugar (or that more sugar disappears in the transit through the brain) than in the arm.

Some Anesthetization Experiments.—In order to study what takes place in the sugar "consumption" when the brain is, so to speak, "knocked out" of the picture by anesthetization, we did punctures in three experiments. In these three cases blood was obtained from the carotid artery, the internal jugular vein, the brachial artery, and basilic vein before an anesthetic was given. At the same time, a lumbar puncture was done. The sugar content was obtained in the blood from these vessels and from the cerebro-spinal fluid space. After the patient had been under anesthesia from 15 to 20 minutes and while he was under anesthesia similar punctures were performed. The rise in blood sugar, which always occurs during anesthetization is well reflected in these cases. It will also be seen that there is no corresponding rise in the cerebro-spinal fluid sugar.

It will be seen that in the first case (Table VII) that there was a difference of 20 milligrams between carotid artery and internal jugular vein before anesthetization and only a difference of 8 at the end of 30 minutes full anesthetization. The difference between the brachial artery and basilic vein, however, remained about the same during, before, and after anesthetization.

In Case II (Table VII) the difference between carotid artery and internal jugular vein before was 15; after 30 minutes anesthetization it was only 3 milligrams; in this case the difference between the brachial artery and the basilic vein, which was 16 before anesthetization, tended to be obliterated by the anesthetization.

In Case III (Table VII) the difference between the carotid artery and the internal jugular vein was 13 before anesthetization, and 2 or practically the same during anesthetization. The difference between brachial artery and basilic was 10 before anesthetization and only 5 after 30 minutes anesthetization, despite the fact that in all these cases there was an increase of blood sugar during anesthetization. In other words, both brain and arm were using less sugar, had—in a phrase—lessened their sugar consumption with anesthetization.

In another case exemplified in Table VIII, the study of the gaseous content was added to the study of the sugar content of the

TABLE VII.

Ether Cases. Sugar Content.

	Before anesthetization.	After 30 min. anesthetization.	Remarks.
Case I.			
Carotid artery	103	161	
Int. jug. vein	80	153	
Brachial artery	109	163	
Basilic vein	87	132	
Spinal fluid	35	36	
Case II.			
Carotid artery	83	146	
Int. jug. vein	68	143	
Brachial artery	86	149	
Basilic vein	70	143	
Spinal fluid	38	38	
Case III.			
Carotid artery	95	105	
Int. jug. vein	82	103	
Brachial artery	94	105	
Basilic vein	84	100	
Spinal fluid	40	41	(after 30 min.)
		42	(after 40 min.)
		42	(after 60 min.)
Case IV.			
Carotid artery	94	116	
Int. jug. vein	85	117	
Brachial artery	95	117	
Basilic vein	89	116	

vessels before and after anesthetization. It will be noted that the difference between the sugar content of the carotid artery and internal jugular vein is 9 before anesthetization and is practically the

TABLE VIII.

ETHER CASE—CO_2, O_2 SUGAR.

(Sugar Mg. per 100 cc. CO_2 and O_2—per cent.)

Before anesthetization.	30 min. after anesthetization.
Carotid	Carotid
Sugar ..... 94 mg. per 100 cc.	Sugar ..... 116 mg. per 100 cc.
CO_2 cont. ..... 54.37%.	CO_2 cont. ..... 52.77%.
O_2 cont. ..... 10.95%.	O_2 cont. ..... 12.39%.
O_2 cap. ..... 12.66%.	O_2 cap. ..... 12.81%.
O_2 sat. ..... 86%.	O_2 sat. ..... 97%.
Jugular	Jugular
Sugar ..... 85 mg. per 100 cc.	Sugar ..... 117 mg. per 100 cc.
CO_2 cont. ..... 61.78%.	CO_2 cont. ..... 60.37%.
O_2 cont. ..... 6.89%.	O_2 cont. ..... 11.55%.
O_2 cap. ..... 12.64%.	O_2 cap. ..... 12.51%.
O_2 sat. ..... 54%.	O_2 sat. ..... 84%.
Brachial	Brachial
Sugar ..... 95 mg. per 100 cc.	Sugar ..... 117 mg. per 100 cc.
CO_2 cont. ..... 53.49%.	CO_2 cont. ..... 54.71%.
O_2 cont. ..... 12.58%.	O_2 cont. ..... 12.75%.
O_2 cap. ..... 12.71%.	O_2 cap. ..... 12.77%.
O_2 sat. ..... 98%.	O_2 sat. ..... 99%.
Basilic	Basilic
Sugar ..... 89 mg. per 100 cc.	Sugar ..... 116 mg. per 100 cc.
CO_2 cont. ..... 58.43%.	CO_2 cont. ..... 55.07%.
O_2 cont. ..... 10.56%.	O_2 cont. ..... 12.47%.
O_2 cap. ..... 12.64%.	O_2 cap. ..... 12.64%.
O_2 sat. ..... 83%.	O_2 sat. ..... 98%.

same during anesthetization. The difference between the sugar content of the bracial artery and the basilic vein is 6 before anesthetization, and it becomes practically the same during anesthetization, whereas there is no difference in their sugar content during anes-

thetization, and in fact, the sugar content in all the vessels is remarkably constant. In other words, during anesthetization in this case the sugar merely circulated from artery to vein without any change in content.

The gaseous content in this experiment shows an almost constant CO_2 content before anesthetization and during anesthetization with a plus and minus variation of 1 to 2 per cent. The oxygen content rises slightly in the arteries, and rises very markedly in the internal

TABLE IX.

BLOOD CHLORIDES. (MG. PER 100 CC.)
(Van Slyke Method.)

Patient.	Diagnosis.	Brachial artery.	Internal jugular vein.	Basilic vein.	Remarks.
W. K.	D. P.	498	500	498	No significant difference
M. Mc.	D. P.	463	464	466	" " "
S. S.	D. P.	462	460	460	" " "
T. M.	G. P.	468	468	466	" " "
H. B. (1)...	D. P.	448	448	449	" " "
(2)...	.....	450	451	452	" " "
T. O'B. (1).	D. P.	454	453	453	" " "
(2).	.....	453	453	452	" " "
E. B. (1)....	D. P.	483	481	.....	" " "
(2)....	.....	480	480	.....	" " "
W. B. (1)...	G. P.	494	494	.....	" " "
(2)...	.....	494	495	.....	" " "
T. H. (1)....	D. P.	473	472	.....	" " "
(2)....	.....	470	472	.....	" " "

jugular vein, reaching nearly the level of the oxygen content in the arteries. Of course, we make no conclusions whatever on these few cases, but with a perfect technique and coordinated chemical examination, it will be possible to get a very fair idea of what takes place in the brain as well as in other parts of the body during drug administration, anesthesia, and so forth.

We are projecting a study of the fats and a further study of the effects of anesthetization by ether and of other drugs.

CONCLUSIONS.

1. The introduction of the internal jugular method has made it possible to study the brain metabolism in a direct way, especially is this true, if it is combined as in our study with the puncture of the carotid artery and, for comparison, with the arm by a puncture of the brachial artery and basilic vein.

2. This technique is entirely safe. In over two years of experience on a large number of cases, our patients have experienced no untoward results, and there has been no damage to the vessels in question.

3. The specific gravity, sedimentation rate, urea nitrogen, nonprotein nitrogen, phosphates, calcium, and chloride content of the blood in the internal jugular vein, carotid artery, brachial artery, and basilic vein is substantially the same.

4. Sugar disappears in the transit between the carotid artery and the internal jugular vein in much the same way as sugar disappears in the transit between the brachial artery and the basilic vein. What we here call brain consumption of sugar, without specifying what is meant by this term or implying anything as to the nature of the process, is quantitatively as great and, in the main we believe, tends to be greater than arm consumption of sugar.

5. Oxygen disappears in the transit between the carotid artery and the internal jugular vein and CO_2 content increases in the same transit. We have not found any significant difference in the few cases that we have yet studied between the brain consumption of oxygen and production of CO_2 and the arm production and consumption of CO_2.

In four cases studied during anesthetization it was found that the sugar content of the blood rose very decidedly. Before anesthetization, however, there was a decided difference between the carotid sugar content and jugular sugar content. This difference tended to disappear during anesthetization.

ERYTHREMIA (POLYCYTHEMIA) WITH A PSYCHOSIS.

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Although neurologic symptoms, such as headache and tinnitus, are characteristically found in erythremia, the occurrence of psychoses is rare. The literature contains, to my knowledge, but nine cases of clearly defined mental disorder occurring in association with erythremia. In three of these (Weber and Watson,[1] Weber,[2] Freund [3]) the psychosis was essentially depressive in nature. Of the other cases, two presented twilight states (Mendel,[4] Stiefler [5]); one had twilight states and olfactory hallucinations (Müller [6]); one had *absences* and olfactory disturbances, every olfactory preception being accompanied by the odor of burning paper (Stiefler [5]); one had obsessions and compulsions (Cassirer and Bamberger [7]); and one had a delirium during the course of a prolonged and severe febrile illness (Ascoli, cited by Lucus [8]).

In view of the evident infrequency of psychoses in erythremia, the following case is deemed of interest:

N. F., male, Hebrew, born in 1882, married, a furniture finisher by occupation, began in the summer of 1925 to complain of attacks of dizziness and roaring in his left ear, occurring every few weeks and lasting 10 or 15 minutes. In August, 1926, he had an attack of unconsciousness followed by right hemiparesis from which he recovered completely within a week. In September, 1926, he was admitted to the Jefferson Hospital, on the service of Dr. Solomon Solis-Cohen. At that time he was found to have cyanosis, moderate enlargement of the spleen, and an erythrocyte count of 8,000,000. A diagnosis of erythremia was therefore made.

Following his discharge from the hospital, in November, 1926, the patient became unhappy, owing to the fact that he had no savings, could not work, and had to apply to a charity agency for assistance. Nothing further was noted until March, 1927, when the patient received a letter from his father in Russia, informing him of the death of a sister. The father, an extremely pious rabbi, severely reproached the patient for his departure from the ways of orthodox Judaism and expressed the belief that the death of the sister was a divine punishment for the impiety of the son. The patient was visibly jarred by this letter and became deeply depressed. Sensing an impending breakdown, he asked a neighbor to look after his wife and children. One

week after the receipt of the letter, he was admitted to the psychopathic division of the Philadelphia General Hospital. The record there states that he talked little, seemed depressed and "apprehensive," and on one occasion asked to be thrown into the river, saying he wanted to drown. He was quite inactive.

In July, 1927, the patient was transferred to the Philadelphia Hospital for Mental Diseases. At that time he weighed 98 pounds, whereas in February, 1927, he had weighed 142. He continued to talk little and at times had to be fed. Occasionally he wet and soiled himself. On December 7, 1927, his wife took him home against advice.

On December 27, 1927, the Jewish Welfare Society referred the patient to the psychiatric department of the Community Health Center, and I saw him for the first time. His facial expression and posture were those that one associates with a pronounced melancholy mood. He was slow in all his actions and spoke little. His wife said at this time that he had become extremely pious, evidently in response to the promptings of his conscience.

For about half a year the patient gave very little trouble at home but was at no time well enough to work. He ate and slept fairly well. His wife had the notion that coitus might help him and on two occasions she induced him to try it. Each time the erection was incomplete, and ejaculation occurred before it was possible to accomplish intromission.

In July, 1928, the patient began to have periods of peevishness and irritability and, because his wife feared he might strike the children, he was returned in September, 1928, to the Philadelphia Hospital for Mental Diseases. There he continued to be inactive and to talk little. As a rule, he spoke only to his wife, and rarely above a whisper. He dressed, undressed, washed, and fed himself satisfactorily, except that everything was done very slowly. On two occasions in May, 1929, when I visited him through the courtesy of Dr. Everett S. Barr, medical director, the patient was obviously deeply depressed and slow in all his movements. Catalepsy and other phenomena suggestive of schizophrenia were absent. No gross abnormalities were found on neurologic examination.

Repeated examinations at the Philadelphia General Hospital and the Philadelphia Hospital for Mental Diseases confirmed the increased erythrocyte count originally noted. The count varied from 6,000,000 to 9,000,000. The Wassermann reaction of the blood and the spinal fluid examinations were negative.

The patient died on August 3, 1929, after a stupor of several days, during which there had been a marked increase in his cyanosis. There was no necropsy.

The psychosis in this case seems to have been a severe retarded depression. The patient had made an apparently normal social and marital adjustment prior to his illness. The onset of the psychosis occurred under circumstances that had very likely evoked in the patient a strong feeling of self-reproach. His mood through-

out was one of deep dejection, the patient on one occasion asking to be thrown into the river. The marked psychomotor retardation, the loss of weight, and the impotence were in line with what is commonly seen in manic-depressive depressions. There was considerable peevishness at times—a symptom which, in certain forms of depression, indicates a relatively poor prognosis (Hoch and MacCurdy[9]).

In this case the erythremia began almost two years before the psychosis. The question naturally arises whether the former was one of the causes of the latter. Although a definite answer cannot now be given, the question lends itself to speculation. Manic-depressive reactions seem to occur by preference in a morphologically and psychologically specific type of individual (Kretschmer[10]), and it has therefore been assumed that in these predisposed individuals there exists a latent disease "tendency" which is activated by a chain of somatopsychic events, such as psychic trauma, infection, exhaustion, parturition, and the like. To suppose that erythremia may act as such a precipitant seems not unreasonable, since it is already known that erythremia may be responsible for a multitude of cerebral symptoms (headache, tinnitus, choreiform movements, muscular twitchings, etc.) as well as for demonstrable cerebral lesions, especially cerebral thrombosis (Cabot,[11] Christian,[12] Ledoux,[13] and others). Furthermore, according to Osler,[14] in erythremia we find "mental and physical torpor," a symptom which occurs with great frequency in manic-depressive depressions. Also, the occurrence of mental disorder in the nine cases cited at the beginning of this article is not to be ignored.

If erythremia may precipitate a depression, it seems possible that one or more of three mechanisms may be involved: (1) The increased blood volume and the increased viscosity of the blood in erythremia may lead to congestion of the cerebral circulation with resultant impairment of the metabolism of the brain. Such a mechanism is not improbable when one considers that in erythremia the spinal fluid pressure has been found to be increased (Böttner[15]). (2) Erythremia may give rise to multiple minute areas of brain softening which in turn may facilitate the appearance of a psychotic process that might otherwise have remained latent. (3) The serious loss of health and vitality is apt to have a demoralizing and depressing effect on an erythremic patient.

SUMMARY.

The case is that of a man who developed erythremia at 43 and a severe depression at 45 lasting until death at 47. Although proof is lacking, it seems possible that the erythremia was one of the factors responsible for the appearance of the psychosis.

I am indebted to Dr. Solomon Solis-Cohen, Dr. David Riesman, Dr. H. K. Mohler, Dr. Everett S. Barr, Dr. Edward Weiss, Dr. C. F. Long, and Dr. H. Ruche for their kindness in placing at my disposal their records of the case.

BIBLIOGRAPHY.

1. F. P. Weber and J. H. Watson: A case of chronic polycythemia with enlarged spleen, probably a disease of the bone-marrow. Trans. Clin. Soc., London, 37: 115, 1904.
2. F. P. Weber: Polycythæmia, erythrocytosis, and erythremia (Vaquez-Osler disease). London, 1921.
3. C. S. Freund: Polycythämie. Berlin. Klin. Wchnschr., 2: 1616, 1914.
4. K. Mendel: Nervöse und psychische Störungen bei Polycythämie. Zentralbl. f. d. ges. Neurol. u. Psych., 41: 513, 1925.
5. G. Stiefler: Ueber Dämmerzustände von epilepsieartigem Charakter bei Polycythæmia rubra und ihre forensische Bedeutung; nebst Bemerkungen über die bei Polycythämie vorkommenden psychischen Störungen. Deutsch. Zeit. f. d. ges. gerichtlich. Med., 7: 289, 1926.
6. E. Müller: Ueber psychische Störungen bei Polycythämie. Folia hæmatologica, 9: 233, 1910.
7. Cassirer and Bamberger: Ein Fall von Polycythämie und Zwangsvorstellungsneurose. Deutsche med. Wchnschr., 33: 1444, 1907.
8. W. S. Lucas: Erythremia, or polycythemia, with chronic cyanosis and splenomegaly. Arch. Int. Med., 10: 597, 1912.
9. A. Hoch and J. T. MacCurdy: The prognosis of involution melancholia. Arch. Neurol. and Psych., 7: 1, 1922.
10. E. Kretschmer: Körperbau und Charakter. Berlin: Springer, 1922.
11. R. C. Cabot: A case of chronic cyanosis without discoverable cause, ending in cerebral hemorrhage. Boston Med. and Surg. Journ., 141: 574, 1899.
12. H. A. Christian: The nervous symptoms of polycythemia vera. Amer. Journ. Med. Sci., 154: 547, 1917.
13. M. E. Ledoux: Accidents thrombotiques cérébraux dans un cas d' érythrémie. Bull. et mem. de la soc. méd. des hôp. de Paris, 48: 748, 1924.
14. W. Osler: Chronic cyanosis, with polycythæmia and enlarged spleen: a new clinical entity. Amer. Journ. Med. Sci., 126: 187, 1903.
15. A. Böttner: Ueber erhöhten Cerebrospinaldruck bei Polycythämie. Münch. med. Wchnschr., 65: 1309, 1918.

THE THYROID FACTOR IN DEMENTIA PRÆCOX.*

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That organic factors play an important rôle in dementia præcox is widely believed. Lange's recent discussion of the marked difference of concurrent incidence of the disorder in biovular as compared with identical twins [1] adds renewed emphasis to the evidence that some organic factor constitutes a necessary link in the chain of causality. That conditioning factors are also important is no evidence against this thesis.

That thyroid abnormality may be one of the causative organic factors is suggested by the widespread disturbances of such functions as blood pressure, pulse rate, carbohydrate metabolism, sweating, sex manifestations, basal metabolism and reaction to adrenalin,[2, 3] all of which are common accompaniments of thyroid disturbances.

The direct evidence from the field of pathology as regards the condition of the thyroid gland in dementia præcox is defective in quality and by no means concordant in tenor. Parhon's findings [4] were not constant. Frank [5] observed increase of connective tissue with decrease of colloid in 4 of 5 cases. Borberg [6] found light fibrosis in two and rather marked fibrosis in 5 of 13 cases. Witte [7] in a series of 815 cases noted a tendency to increased colloid with advancing age. Morse [8] in 27 cases found occasional moderate hyperplasia or fibrosis. Lewin [9] reported fibrosis in 29 of 30 cases. He makes the criticism, however, that, in general, control observa-

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The expenses of this research were met in part by the Memorial Foundation for Neuro-Endocrine Research, Boston. In this paper only thyroid deficiency is considered. Hyperthyroidism in relation to dementia præcox has recently been discussed by De Courcey. (J. Nerv. & Ment. Dis. 68: 348. 1928.

tions, where these have been made at all, fail to show that the thyroid abnormalities are more numerous among the subjects of dementia præcox than among other subjects of the same age and nutritional state or suffering from the same somatic diseases as the psychotic. This fact, however, can of course be interpreted as indicating that thyroid disorders are of frequent occurrence not only in dementia præcox but also in wasting diseases and in old age. They may be of important etiological significance in all. More significant is the objection that in none of the reported investigations has adequate technic been used. Thyroid material should be collected in a fresh state from schizophrenic subjects otherwise in good health, and studied by modern cytological methods and with proper controls. Until this is done the question must remain open whether dementia præcox is characterized by any distinctive morphological changes in the thyroid gland.

The evidence from the therapeutic literature is likewise inadequate. That thyroid substance has been administered to many subjects of dementia præcox one finds vague evidence. Kraepelin [10] for example, wrote: "Many years ago I endeavored to acquire influence on dementia præcox by the introduction of every possible organ, of the thyroid gland, of the testes, of the ovaries, and so on, unfortunately without any effect." In 1923 Wagner-Jauregg,[11] also reporting in general terms, wrote in opposite, optimistic tenor. He claimed that in many cases of early hebephrenia the psychosis can be favorably influenced by extracts of the thyroid and sex glands and that in the group of women showing early dementia præcox associated with genital hypoplasia thyroid and ovarian extracts induce the appearance of secondary sexual changes with correction of the psychosis. Lewis and Davies [12] have reported a few cases of definite hypothyroidism with excellent results from thyroid therapy. Mayer [13] reported the case of a catatonic subject who, under thyroid treatment, went through a manic phase then became free from gross psychotic symptoms. Davidson [14] also reported a successful case; the thyroid was pushed to toxic limits then reduced, whereupon the psychosis completely cleared up. A particularly striking case of 20 years' duration in a man past 50 with restoration of mental health under vigorous thyroid therapy was described by Sawkins.[15]

Of the negative results mentioned by other writers little can be said. At the present stage of endocrine knowledge negative results are usually not conclusive. Before one can render an adverse decision it must be shown that the gland substance selected was the one indicated in the individual case, that a potent preparation was used, that the dosage was adequate and that treatment was continued for a sufficiently long period. In the negative reports on thyroid therapy in dementia præcox that have come to our notice these conditions have not been fulfilled.

For the past three years we have been engaged in a diagnostic-therapeutic study of dementia præcox. Up to February 1, 1930, 130 cases had been studied to a sufficient extent to permit a diagnosis and many of the patients have received more or less endocrine gland treatment. The diagnostic methods developed by Rowe and his collaborators [16, 17] have largely been followed. In brief, a case history of each patient is obtained and he is subjected to a careful physical examination. Then a series of special tests is made, first to determine the presence or absence of endocrine disorders, then to differentiate among the various glands that might be at fault.

The routine tests include an analysis of two 24-hour urine samples for volume and specific gravity, from which the "total solids" is calculated; total nitrogen; urea nitrogen, creatinin nitrogen; and residual nitrogen. Since catheterization as a routine procedure is not feasible the creatinin determination is of special importance as indicating whether a true 24-hour sample has been secured. Similarly, a fasting blood sample is analyzed for non-protein, urea, uric acid and creatinin nitrogen and for reducing bodies (calculated as dextrose). The basal metabolism is determined, with special regard to technic applicable to psychotic subjects. A critique on this subject has been published elsewhere.[18, 19] The blood pressure, pulse rate, rectal temperature and respiratory rate are also determined while the patient is in repose, in the basal metabolism laboratory. As a check on the degree of relaxation obtaining, the pulse rate and temperature are compared with records of the same features obtained daily in the wards. The blood morphology is studied in duplicate, the specimens being taken on consecutive days and with care not to excite the patients. The study includes red and white cell counts together with differential leucocyte determina-

tions. Since the concurrence of kidney malfunction would vitiate certain of the tests, the phenolsulphonethalein output is determined as an index of renal function—though with due regard to the limitations of that test. Further information as to kidney function is, of course, derived from a study of the urine and blood analyses. One of the most important differential tests is the determination of galactose tolerance. In few cases are any of the tests pathognomonic but a high galactose tolerance in actual practice nearly always indicates marked depression of pituitary activity. The weight together with the sitting and standing heights are determined, though these data have not proved to be of much value in determining the minor degrees of endocrine deficiency with which we ordinarily deal. Occasionally, however, the sitting height index is of some value in differentiating between thyroid and pituitary involvement. The "lung volume" as determined by spirometer tests is also recorded. This datum, dependent as it is for validity upon the degree of cooperation secured, would seem, *a priori,* to be of little value in psychotic patients. As a matter of fact, however, it furnishes an important differential indication as between thyroid and pituitary deficiency. "Urobilinogen" determinations are also made, but these have not been particularly helpful. The same can be said of alveolar air analyses. In certain cases the interpretation of the test findings is dependent upon the presence or absence of liver dysfunction. Accordingly, it is occasionally found desirable to determine direct and indirect Vanden Bergh reactions and the bromsulphalein output. These are supplemented with Graham tests. As bearing on the interpretation of the galactose tolerance test, the condition of the gastro-intestinal tract as regards peristaltic functions is determined. For example, delayed stomach discharge might give a false high galactose tolerance reading. The presence or absence of colonic and rectal stasis is also of some differential significance, as between thyroid and pituitary disorders. In case the blood examination discloses eosinophilia a stool examination is included in the routine.

In the interpretation of the tests each must be evaluated in the light of the general bodily condition and frequently in relation to many of the others. Before any deviation from normality is interpreted as indicative of endocrine disorder an attempt is made to exclude all non-endocrine causes. The validity of the diagnosis is

to a considerable extent dependent upon the degree of success in making such exclusions. For example, a high eosinophile count might be the determining feature in differentiating between thyroid and pituitary failure, but a concurrent intestinal infection might entirely invalidate the test.

Space is not available for a complete discussion of the subject of differential diagnosis. The topic has been treated at length by Rowe.[20] Suffice it here to set down arbitrarily the typical picture that we recognize us indicating thyroid deficiency.*

Urine:
- Amount, reduced.
- Total solids, reduced.
- Total nitrogen, reduced.
- Residual nitrogen, trending upward.
- Albumen, often present.

Basal metabolism, reduced.
Blood pressure, reduced.
Pulse rate, reduced.
Temperature, reduced.
Respiratory rate, normal or reduced.
Blood morphology:
- Erythrocyte count, reduced.
- Leucocyte count, normal.
- Lymphocyte count, increased.
- Eosinophile count, normal.

Blood chemistry:
- Non-protein and urea nitrogen, trending upward.
- Uric acid, normal.
- Sugar, low normal.

Phenolsulphonephthalein output, trending downward.
Galactose tolerance, normal.
Weight, usually abnormal, most frequently low.
Lung volume, reduced.
"Urobilinogen," normal.
Gastric emptying time, normal.
Colon emptying time, delayed.

The degree of deviation of the various data and, to some extent, the presence or absence of deviations depend upon the degree of thyroid deficiency. For example, in high grade deficiency the basal metabolic rate may be as low as 45 per cent below normal. In

* McLester[21] has recently described a rather similar picture of thyroid deficiency as a cause of ill health in non-psychotic subjects.

minor grades of deficiency it may be reduced as little as 15 or 20 per cent. A further difficulty in interpretation arises from the fact that the degree of deviation is frequently of differential value. Thus a 25 per cent reduction of the basal rate might indicate either a moderate degree of thyroid deficiency or a fairly high degree of pituitary deficiency. The accompanying table reproduced from Rowe [20] will give some indication of the significance of the quantitative factor in the interpretation of metabolic deviations:

ILLUSTRATIVE DATA IN HYPOTHETICAL IDEAL CASES.

Deficiency of	Pit.	Thy.	Ovary	Test.	Adr.
Basal rate	−25%	−45%	−18%	−6%	−35%
Pulse	68	50	78	72	76
Respiration	14	10	16	15	15
Temperature	98.2°	97.0°	98.2°	98.4°	97.8°
Blood pressure:					
Systolic	110	100	98	112	90
Diastolic	70	60	65	75	60
Galactose tolerance ...	+100%	±0%	−50%	±0%	−83%

In the practical use of the diagnostic system one keeps in mind the typical picture for each of the glands in both hyper- and hypofunctional states and records as his diagnosis that picture to which the sum total of the findings in the individual patient most nearly conforms. In Rowe's practice an obscure picture can often be resolved by the use of various supplementary tests, but in psychotic patients we frequently have to leave the differential diagnosis indeterminate except as it may ultimately be resolved by therapeutic tests.

Difficult as are the applications of the foregoing physical tests they do at any rate largely lend themselves to quantitative expression. Fully as important and much more difficult are the determinations of the psychiatric diagnosis, prognosis and mental progress of the patients. In general, random selections from the Hospital population have been made though with some attention to securing in the whole series a representative cross section as regards age of patient, period of hospitalization and psychiatric types. In the first stage of the work, however, by way of facilitating orientation there has been some degree of selection of younger subjects and more acute cases, since the psychosis is less resistive to treatment in these

and since the physical diagnostic picture is less obscured by age as such and by preceding physical diseases.

Unless the mental condition of the individual patient is well known he is held in the research ward for about three months for intensive observation. During this period frequent notes on his mental condition are recorded by the ward nurse, ward psychologist and ward psychiatrist. At monthly intervals notes are recorded by the workers in the Occupational Therapy Department on the patient's social attitude and his ability or willingness to cooperate and the sort of work he is capable of doing. During this period he is brought before the Hospital Staff and complete diagnostic notes are recorded, based primarily on the examination at that time. A prognosis is also recorded. During this period, too, he receives a somewhat elaborate psychometric examination.

In the meanwhile, an endocrine diagnosis having been made the patient is either excluded from further study as unsuitable for endocrine treatment or else is placed under treatment in accordance with the diagnostic findings. The grounds for exclusion have been either lack of endocrine indications or favorable initial prognosis. The various observers continue their notes as the treatment progresses and at suitable intervals, from three to six months, the Staff review and the psychometric examinations are repeated and formal notes on progress as compared with the previous examination are recorded. In general, neither the members of the Staff nor the psychologists are informed as to whether the patient is under treatment or if so, as to the nature of the treatment. After a period of medication, typically of three months, the patient is kept under observation for a control period without medication.

Further details regarding the methods used have been reported elsewhere.[11]

The fact that patients with a favorable prognosis have been systematically excluded from treatment obviously renders impossible a comparison of our therapeutic results with those of any method of treatment in which more hopeful cases are included.

Results.

Among the first 130 cases 42 subjects were diagnosed as "not demonstrably endocrine." The other 88 all showed more or less

evidence of endocrine deficiency. Of these, 13 were diagnosed as showing relatively uncomplicated thyroid deficiency; 5, thyroid deficiency with evidence of other grandular involvement; 13, pituitary deficiency, and 57, endocrine deficiency unclassified. In a considerable number of these it is believed that the adrenal glands are involved. In 2 cases, among the 57, recent results of therapeutic tests have indicated a predominance of the thyroid in the glandular deficiency; indeed a possible thyroid element was recorded before the results of the therapeutic tests were known. In all groups the endocrine deficiencies have usually appeared in relatively minor degrees of severity.

Of the 13 patients diagnosed as frankly "hypothroid," 11 received thyroid treatment. In 8 cases thyroid alone was used and significant improvement followed in all. The initial prognosis was "poor" in 5 and "bad" in 3 of these cases. Five of the 8 are now at home. In 3 of the 11 cases—the prognosis being "poor" in each—thyroid was combined with adjuvants. Two of the 3 have also shown significant improvement under medication. In this total group of uncomplicated treated hypothyroid subjects, 91 per cent have shown improvement and 46 per cent are now at home (Table I).

If the 5 complicated cases of thyroid deficiency are added a group of 16 subjects is secured. Of these 11 have been treated with thyroid alone and 5 with thyroid in combination. It is believed in the light of all our therapeutic experience to date that the thyroid component was at least partially responsible for the improvement in these cases. Fourteen of the 16 subjects, or 88 per cent, have shown significant improvement, but the number well enough to be at home remains 5 or 31 per cent. In the total series of improved cases the prognosis was "poor" in 8, "bad" in 5 and "indeterminate" in 1 (Table II).

Of the patients diagnosed as "not endocrine" 10 have received thyroid treatment. In 2 cases thyroid material was used alone and neither patient showed significant improvement though one was sent home with his psychosis apparently in an arrested condition. Eight patients received thyroid in combination with other medicaments. Of the 8, 4 have shown definite improvement and one has been sent home. Of the total 10 "non-endocrine" subjects receiving thyroid treatment the number showing significant improve-

TABLE I.

Thyroid Deficiency.

Pt.	Age.	Psychosis.	Prognosis.	Hospital period, years.	Average thyroid dosage, grains.	Duration, days.	Effect.	Present status.
C. A.	28	D. P., Un.	Poor	1	0.8	49	Improved	Continued
					Rest period		Regressed	
					20.4	294	Improved, on visit	
					Rest period		Relapsed	
B. B.	30	D. P., C.	Poor	1/12	31.1	65	Improved	Continued
					Rest period		Improvement	Continued
					30.0	96	Improvement	At home since May 25, 1929
N. C.	27	D. P., C.	Poor	¼	4.3	14	Improved	Removed
E. C.	25	D. P., H.	Poor	¼	None			Case discontinued
C. K.	27	D. P., P.	Poor	2	6.0	60	Indeterminate	Continued
					6.0	36	Moderate improvement	
					(With insulin)			
H. K.	19	D. P., Un.	Poor	9	30.0	15	Indeterminate	Continued
					(With adrenali)		No change	
					18.0	53	No change	
					Rest period			
A. P.	25	D. P., Un.	Good	⅙	None			Discontinued
D. S.	34	D. P., H.	Bad	½	4.0	105	Slight improvement	Continued
					30.0	93	Definite improvement	At home since Sept. 23, 1929
					Thyroxin by vein, 8.0 mgm. in 83 da.		Improvement	
							More catatonic	
					Rest period		Marked improvement	
					Thyroxin per os, 2.4 mgm., 120 da.			
F. S.	30	D. P., C.	Poor	4	5.8	101	Marked improvement	At home since Sept. 4, 1928
G. S.	34	D. P., H.	Bad	10	4.4	77	Improved	Continued
					17.5	65	Further improvement	
					Rest period		Slight regression	
					10.3	232	Improved	

TABLE I—Continued.

Thyroid Deficiency.

Pt.	Age.	Psychosis.	Prognosis.	Hospital period, years.	Average thyroid dosage, grains.	Duration, days.	Effect.	Present status.
J. F. S. 2d attack	26	D. P., S.	Poor	¼	6.0 (With Ammonium Phosphate, Viosterol Vi-C, and Manganese Chloride, by mouth)	109	Slight improvement	Continued
H. V. B.	33	D. P., H.	Bad	¼	11.0	200	Marked improvement	At home since Oct. 23, 1929

In this and succeeding tables, "D. P., H." means hebephrenic dementia præcox. Similarly "S" signifies simple type, "C," catatonic, "P," paranoid and "Un," unclassified. "Hospital Period" indicates time in hospital at beginning of study.

The tabulations are based on results to February 1, 1930.

Average age at beginning of study 27.8
Average hospital period beginning of study 2.2

Total number of cases 13
Total number treated with thyroid alone 8
Definitely improved 8
Prognosis: Poor, 5. Bad, 3.
Sent home 5
Prognosis: Poor, 3. Bad, 2.
Not definitely improved 0
Total number treated with thyroid in combination 3
Definitely improved 2
Prognosis: Poor 2.
Sent home 0
Not definitely improved 1
Prognosis: Poor, 1.
Total treated 11
Not treated 2
Total improved 10
Total at home 5
Total not improved 1

TABLE II.

Thyroid Deficiency—Complicated.

Pt.	Age.	Psychosis.	Prognosis.	Hospital period, years.	Average thyroid dosage, grains.	Duration, days.	Effect.	Present status.
D. D. Female	28	D. P., H.	Bad	4	6.0	150	None	Continued
A. F.	21	D. P., H.	Poor	6	2.9 9.5	71 49	Slight improvement Slight improvement	Continued
D. I.	34	D. P., C.	Bad	4	6.3 Rest period	104	Improved Depressed	Continued
G. M.	26	D. P., H.	Bad	3	7.3 (With A. L. Pit. & Felamine)	111	Marked improvement	Continued
A. B. R.	26	D. P., Un.	?	1/12	8.3 3.0 (With pituitary, 28 days)	65 40	? Improved	Continued

Average age at beginning of study 27.6
Average hospital period at beginning of study 2.6

Combined Data, Including Those of Table I

Total number of cases 18
Total number treated with thyroid alone 11
Definitely improved 10
Prognosis: Poor, 6; Bad, 4.
Sent home 5
Prognosis: Poor, 3; Bad, 2.
Not definitely improved 1
Prognosis: Bad.
Total number treated with thyroid in combination 5
Definitely improved 4
Prognosis: Poor, 2; Bad, 1; Indeterminate, 1.
Sent home 0
Not definitely improved 1
Prognosis: Poor.
Total treated 16
Not treated 2
Total improved 14
Total at home 5
Total not improved 2

TABLE III.

NOT DEMONSTRABLY ENDOCRINE.

Pt.	Age.	Psychosis.	Prognosis.	Hospital period, years.	Average thyroid dosage, grains.	Duration, days.	Effect.	Present status.
A. B.	26	D. P., S.	Bad	2	3.0 (With A. L. pit. and Gonad)	74	None	Discontinued
J. F.	30	D. P., Un.	Poor	1	7.8 (With gonad and A. L. pit.)	187	None	Continued
T. McD.	21	D. P., H.	Poor	5	6.0 (With ammon. phos. and insulin)	266	Improved	Continued
D. M.	24	D. P., Un.	Bad	1	3.0 (With adrenalin and W. G. pit.)	232	Slight improvement	Continued
C. D.	39	D. P., S.	Fair	1/12	6.0	34	None	At home
J. O'C.	26	D. P., C.	Fair	½	6.0 (With pit. and gonad)	75	Improved	At home
A. R.	22	D. P., C.	Poor	5	5.0 (With pit. and gonad)	109	None	Discontinued
C. S.	42	D. P., H.	Bad	4	11.1 (With pit. and gonad)	156	None	Discontinued
E. O.	29	D. P., H.	Bad	2	9.0 (With ammon. phos.)	138	Improved	Continued
P. R.	51	D. P., S.	Bad	5	5.9	108	None	Continued

Average age at beginning of study 31.0
Average hospital period at beginning of study 2.6
Total number of cases 10
Total number treated with thyroid alone 2
- Definitely improved 0
- Sent home unimproved 1
  - Prognosis: Fair.
- Not definitely improved 2
  - Prognosis: Fair, 1; Bad, 1.

Total number treated with thyroid in combination 8
- Definitely improved 4
  - Prognosis: Fair, 1; Poor, 1; Bad, 2.
- Sent home 1
  - Prognosis: Fair.
- Not definitely improved 4
  - Prognosis: Poor, 2; Bad, 2.

Total improved 4
Total sent home 2
Total not improved 6

Total improved 7
Total sent home 3
Total not improved 4

TABLE IV.

Endocrine Deficiency—Unclassified.

Pt.	Age.	Psychosis.	Prognosis.	Hospital period, years.	Average thyroid dosage, grains.	Duration, days.	Effect.	Present status.
A. C.	27	D. P., Un.	Poor	1/12	6.0	62	None.	Continued
V. C.	16	D. P., H.	Bad	½	6.0	51	None.	Continued
					12.0	41	None.	
					(With pit. and fela.)		None.	
					Rest period		None.	
					6.0	75		
					(With ammon. phos. and ca. lactate)			
F. C.	27	D. P., S.	Poor	3	6.0	46	None.	Continued
					(With ammon. phos.)			
P. D.	44	D. P., Un.	Fair	1	6.0	47	None.	At home
					(With A. L. pit. and Vi-C)			
J. F.	37	D. P., Un.	Poor	5	3.0	80	More tense	Discontinued
					(With A. L. Pituitary)			
S. G.	38	D. P., Un.	Poor	⅙	8.5	108	None.	Continued
H. G.	44	D. P., P.	Poor	1	6.0	120	None.	Discontinued
J. G.	38	D. P., H.	Bad	13	6.0	118	Improved	Continued
E. H.	35	D. P., Un.	Poor	5	3.0	78	Improved	Continued
J. H.	22	D. P., H.	Bad	⅙	1.5	67	None.	Continued
					6.1	97	None.	
T. H.	30	D. P., C.	Bad	2	1.9	127	Improved	Continued
					26.8	108	Improved	
Al. J.	22	D. P., C.	Fair	1⅓	5.9	79	None.	Continued
					Rest period		Improved	
					Thyroxin, 3.2 mgm.	76	Marked improvement	
Ar. J.	27	D. P., Un.	Good	1/12	6.0	62	None.	Continued
					(With am. phos.)		Improved	
					6.0	72		
					(With endomin)			
B. K.	26	D. P., Un.	Poor	⅙	3.0	31	None.	Escaped
					(In combination)			

TABLE IV.—Continued.

Endocrine Deficiency—Unclassified.

Pt.	Age.	Psychosis.	Prognosis.	Hospital period, years.	Average thyroid dosage, grains.	Durations, days.	Effect.	Present status.
D. K.	19	D. P., Un.	Poor	2	6.7 (With various combinations and doses)	205	None.	Continued
N. LaR.	29	D. P., H.	Poor	4	6.0 (In combination)	170	None.	Continued
A. M.	37	D. P., S.	Poor	13	9.0	41	None.	Continued
					3.0	57	None.	
J. N.	33	D. P., H.	Bad	1	6.0	135	Regressed (?)	Transferred
					6.0 (With insulin)	113	Improved	
L. P.	38	D. P., H.	Bad	14	6.0 (In combination)	207	None.	Continued
A. P.	26	D. P., H.	Bad	10	3.0 (In combination)	63	Slight improvement	Continued
D. P.	31	D. P., P.	Bad	1½	4.2 (In combination)	111	None.	Discontinued
F. P.	33	D. P., P.	Bad	5	Thyroxin, 2.4 mgm.	70	None	Continued
D. R.	25	D. P., C.	Poor	4	1.6	103	Improved	Continued
					(In combination)		Improved	Continued
					6.0 (In combination)	123		
W. S.	35	D. P., Un.	Poor	1	9.0	63	None	Continued
					6.0 (In combination)	66	None	
D. S.	22	D. P., Un.	Poor	1/12	7.7 (In combination)	105	None	Discontinued
G. S.	28	D. P., Un.	Fair	3	9.7	113	None	Discontinued
C. S.	38	D. P., Un.	Poor	1	18.9	109	None	Continued
A. S.	23	D. P., C.	Poor	1/12	9.0 (With am. phos.)	88	Improved	Continued
					Thyroxin, 4.8 mgm.	22	Improved	

TABLE IV.—CONTINUED.

ENDOCRINE DEFICIENCY—UNCLASSIFIED.

Pt.	Age.	Psychosis.	Prognosis.	Hos-pital period	Average thyroid dosage, grains.	Dura-tion, days.	Effect.	Present status.
J. F. S.	38	D. P., Un.	Bad	1	6.0 (With 3 weeks of adrenal cortex, then endomin.)	104	Improved	Continued
J. T.	31	D. P., P.	Poor	4	1.8 (With gonad, pit., adrenal cortex, and am. phos.)	24	None	Discontinued
A. Z.	41	D. P., H.	Bad	10	7.6	96	Slight improvement (?)	Continued

Average age at beginning of study 31.0
Average hospital period at beginning of study 3.2

Combined Data, Including Those of Table III.

Total number of cases 41
Total number treated with thyroid alone 15
Definitely improved 4
Prognosis: Fair, 1; Poor, 1; Bad, 2.
Sent home 1
Prognosis: Fair.
Not definitely improved 11
Prognosis: Fair, 2; Poor, 5; Bad, 4.
Total number treated with thyroid in combination 26
Definitely improved 10
Prognosis: Good, 1; Fair, 1; Poor, 3; Bad, 5.
Sent home 1
Prognosis: Fair.
Not definitely improved 16
Prognosis: Fair, 1; Poor, 10; Bad, 5.
Sent home 1
Prognosis: Fair.
Total improved 14
Total sent home 3
Total not improved 27

ment was 4 or 40 per cent (Table III). Had thyroid alone been used the proportion of improvement would probably have been less.

A control group numerically more adequate can be obtained by combining with the " non-endocrine " thyroid-treated subjects those diagnosed as " endocrine deficiency unclassified." It is probable that a certain proportion of the group thus constituted had some degree of thyroid deficiency but assuming the absence of this factor merely adds weight to the difference in therapeutic results that were obtained in the " hypothroid " and the " control " groups. In the combined series the total number of cases is 41. The number showing improvement under thyroid medication alone is 4. The number improved under thyroid in combination with other medicaments is 10 or the total number showing significant improvement is 14 or 34 per cent (Table IV). Here, again, the use of other medicaments than thyroid probably increased the incidence of improvement.

TABLE V.

COMPARATIVE THERAPEUTIC RESULTS.

	Thyroid deficiency.	Control group.
Number treated	16	41
Number improved	14	14
Percentage improved	88%	34%
Number sent home	5	3

The contrast between 88 per cent of hypothyroid subjects improved mentally under thyroid treatment with 34 per cent of the control subjects improved under similar treatment is offered as evidence that thyroid gland deficiency had played a significant part in the etiology of their psychoses. The improvement in the non-thyroid group may be largely ascribed to the more favorable environmental conditions and increased personal attention in the research wards as compared with the regular wards. This value gives an index of the extent to which the incidence of improvement in the hypothyroid patients may be subject to discount as due to other than the thyroid treatment.

As regards dosage, there was so much variability that averages would be largely meaningless. Some patients reacted favorably to relatively small doses but individual patients received up to 50

grains a day over a period of weeks or even 60 grains for shorter periods (in the Tables these high dosages are submerged by recording the *average* throughout the treatment period). The attempt was made in each case by gradual increase of dosage to establish empirically the optimal for the individual. In numerous instances the dosage was carried to the extent of giving mild temporary intoxication marked by tachycardia, loss of weight, hyperthermia and supranormal basal metabolic rate. In no case, however, have we seen evidence of any lasting harmful effect. In general, in our series as in most of the successful cases in the literature, the dosage was notably high in comparison with that commonly used. In a few cases it was not until we had shifted from desiccated thyroid substance to pure thyroxin that adequate dosage could be achieved.* The high " resistance " shown by schizophrenic patients to thyroid medication is probably to be ascribed to defective absorption.

In a few instances the first effect of beginning thyroid treatment was increase of weight and lowering of basal metabolism (tentatively ascribed to better cooperation), but usually significant mental improvement was not secured until loss of weight and increase in basal metabolism was brought about.

In numerous instances the first evident effect of the thyroid treatment was an increase in the catatonic features of the case. Thus, in some instances a hebephrenic picture was converted into a catatonic and progressive improvement toward normality then ensued.

There was no systematic correlation to be recognized between general physical and mental improvement throughout the group, though normalization of the basal metabolic rate and correction of secondary anemia were common features. Ordinarily, too, the protein metabolism improved but most of the patients remained underweight and in few instances was the body temperature or blood pressure brought up to normal. There is a suggestion, therefore, that even in the cases diagnosed as purely hypothyroid some other obscure glandular deficiency was also operative.

The desirability of more elaborate statistical treatment of the data in a study of this kind is recognized but this is deferred until

* We are indebted to Armour and Company and to E. R. Squibb and Sons for generous supplies of material used in this research.

a larger number of cases has been secured. Inspection of the tables seems to show that the better results secured in the hypothyroid group cannot for the most part, at least, be accounted for because of more favorable intitial conditions as regards psychotic types, age or period of hospitalization.

Summary and Conclusions.

Among 130 subjects of dementia præcox a group of 18 was diagnosed as suffering from thyroid deficiency. Of these 16 received thyroid treatment. Significant mental improvement followed in 14 or 88 per cent of the cases and 5 patients became well enough to go home. In a control group of 41 patients receiving similar treatment the incidence of significant improvement was 34 per cent. There was probably some degree of thyroid deficiency in various subjects of the control group since 31 were recorded as showing "endocrine deficiency unclassified." A considerable number of the control subjects received other than thyroid medication which probably contributed to the improvement shown. In general, cases presenting a favorable initial prognosis were excluded from treatment.

The results of the study are interpreted as indicating that thyroid deficiency plays a significant rôle in more than 10 per cent of state hospital cases of dementia præcox and that in properly selected cases thyroid medication in adequate dosage and for a sufficiently prolonged period results in significant improvement. On the other hand, relatively little success is to be anticipated from thyroid medication in cases selected at random.

BIBLIOGRAPHY.

1. Lange, J.: Zwillingspathologische Probleme der Schizophrenie. Wien. klin. Wchnschr. 42: 1213. 1929.
2. Langfeldt, G.: The Endocrine Glands and Autonomic Nervous System in Dementia Præcox. J. W. Eides, Boktrykkeri A/S Bergen, 1925.
3. Hoskins, R. G.: Endocrine factors in dementia præcox. New England J. Med. 200: 361. 1929.
4. Parhon, C.: Les glands á secretion interne dans leur rapports avec la physiologie et la pathologie mentale. Encephale, 15: 375. 1913.
5. Frank, M.: Veränderungen an den endokrinen Drüsen bei Dementia præcox. Ztschr. f. ang. Anat. 5: 23. 1919.
6. Borberg, N. C.: Histologische Untersuchungen der endokrinen Drüsen bein Psychosen. Arch. f. Psychiat. 63: 391. 1921.

7. Witte, F.: Ueber anatomische Untersuchungen der Schilddrüse bei der Dementia præcox. Ztschr. f. d. ges. Neurol, u. Psychiat. 80: 190. 1923.
8. Morse, M. E.: The pathological anatomy of the ductless glands in a series of dementia præcox cases. J. Neurol, and Psychopath. 4: 1. 1923.
9. Lewin, B. D.: A study of the endocrine organs in the psychoses. Am. J. Psychiat. 7: 391. 1927.
10. Kraepelin, E.: Dementia Præcox and Paraphrenia. Translation by R. Mary Barclay. Ed. G. M. Robertson. Chicago Med. Book, Co., 1919.
11. Wagner-Jauregg: Organotherapie bei Neurosen und Psychosen. Wien. klin. Wchnschr. 36: 1. 1923.
12. Lewis, N. D. C. and Gertrude R. Davies: A correlative study of endocrine imbalance and mental disease. J. Nerv. and Ment. Dis., 54: 385; 493. 1921. 55: 13. 1922.
13. Mayer, W.: Ueber Psychosen bei Störung der inneren Sekretion. Ztschr. f. d. ges. Neurol. u. Psychiat. 22: 457. 1914.
14. Davidson, A.: A case illustrating the use of thyroid extract in dementia præcox. Australian M. Gaz., 30: 200. 1912.
15. Sawkins, F. J. T.: Some notes on thyroid therapy. Med. J. Australia, 2: 677. 1924.
16. Rowe, A. W.: Studies of the endocrine glands. I. A general method for the diagnosis of abnormal function. Endocrinol. 12: 1. 1928.
17. Hoskins, R. G. and F. H. Sleeper: Endocrine studies in dementia præcox. Endocrinol. 13: 245. 1929.
18. Hoskins, R. G. and F. H. Sleeper: Basal metabolism in schizophrenia. Arch. Neurol. and Psychiat. 21: 887. 1929.
19. Hoskins, R. G. and F. H. Sleeper: A case of hebephrenic dementia præcox with marked improvement under thyroid treatment. Endocrinol. 13: 459. 1929.
20. Rowe, A. W.: Studies of the endocrine glands. IX. The differential diagnosis of endocrine disorders. Endocrinol. 13: 327. 1929.
21. McLester, J. S.: Thyroid deficiency as a cause of poor health. M. Clin. North Am. 12: 1357. 1929.

DISCUSSION.

DR. NOLAN D. LEWIS (Washington, D. C.).—*Mr. President, Ladies and Gentlemen:* As Dr. Hoskins has emphasized, because of the severe vegetative and other somatic disturbances seen in many of these cases of dementia præcox, investigators have from time to time attempted to find somatic fixation points which would help not only in the diagnosis and prognosis, but to determine some of the foci around which the personality is developed.

Dr. Hoskins has reported on a very definite group which was selected from the chemical standpoint. He has emphasized that there has not been a

concordance in results in the literature in investigations of the endocrine system, probably because of the differences and inadequacies in the technic. I will almost venture to say that, granting others may use the refined technic which Dr. Hoskins has organized and which apparently was better than any heretofore presented, there will be the same non-concordance in results because of the fact of the extreme flexibility of the clinical classifications in the dementia præcox group. We are dealing there with a very heterogeneous group of individuals who behave in total personality responses. I think there is very little question but that the thyroid has something to do with the integration of the personality; certainly an organ, with a past genetic history, such as the thyroid gland has, and with its metabolic functions and with its sympathetic nervous system connections and therefore having something to do with emotional responses, must suffer in any disorganization of this so-called personality.

I perhaps would take a little issue with those who speak of pathology in mental diseases in terms of cause and effect. I think we have to look first towards total responses—total reaction types. The criticism that has been brought up that thyroid changes which have been found anatomically and sometimes chemically are the same as those found in individuals dying with other diseases, is a well taken one, but from another aspect, it seems to me there is no clear-cut dividing line, we have in dementia præcox, not a disease entity in the sense of many other disorders and the personality has a constitutional organization which develops a constitutional pathology as expressed in certain types of disease syndromes which are characteristic of and a part of the schizoid personality, *i. e.*, the circulatory type, the endocrine constellation, the type of vegetative nervous system functions, the tendency to tuberculosis and the schizophrenic mental symptoms are the several expressions of the same process. We have to deal here with cross sections and also with longitudinal sections of human constitutions.

So what is found in any of these glands in dementia præcox must not forthwith be interpreted as cause, nor on the other hand as result, but more scientifically as a part of the profound disturbance.

If I may make a suggestion, I believe that the pathology of mental disorders should be approached from the clinical side in this way: We will have to have a little better clinical organization. If we can look at the individual and be able to outline his mental organization clinically in terms of regressions, in terms of balances, and of hypercompensations and thus in a way make a quantitative estimation of his behavior in these terms and then look at the total pathology of the individual and the total chemistry, I prophesy that we will see many very close relationships. The label "Dementia Præcox" includes such a heterogeneous group of individuals with all sorts of diversities that it is unsafe to use it or any other mental disease label for statistical investigations.

I am interested in Dr. Hoskins' work. I always have been, and I feel that this paper has given us a new start along the lines of chemical investigation and if these are followed in definite groups and looked at as a part of the

general organization of the præcox personality, I think it will contribute a great deal towards the total chemistry of the personality reactions.

DR. KARL A. MENNINGER (Topeka, Kansas).—Dr. Hoskins asked me to discuss his paper, which I am very happy to do. My slant on the problem which he has presented is this, that schizophrenia represents the disintegration to which a certain type of personality is subject, that that disintegration is probably favored by certain factors, all of which we do not know, some of which we do know. We also know that analogous with the chemical process of reversibility there are probably certain catalytic agents favoring the disintegration of the personality which will favor its reintegration if we can discover what they are. We know, for example, certain rare instances where noxious agents appear to bring about the breaking down of personality, and in other instances of a broken down personality of the same sort, appear to bring about recovery. If I may make myself a little more clear, I mean that infectious diseases, for example, which occasionally overwhelm the personality to the extent of producing a mental breakdown of the sort known as schizophrenia, apparently are the agents whereby restitution of mental integrity occurs. People who are sick with schizophrenia have a shock or infection, artificial or spontaneous, and following shortly thereafter recover their mental health.

Rare as this phenomenon is, it is exceedingly important from a theoretical standpoint particularly as related to the paper under present discussion. The doctor has not talked about causes and effects, which seems to me to be greatly to his credit. He has simply said that in a group of schizophrenics he found that a certain number of them seemed to have thyroid deficiency, that he gave them thyroid and that they thereafter improved; in some instances, they seemed to recover. It seems to me that such work is very creditable and very courageous. It is a courageous thing to come in and say, "I have cured some patients," particularly before this audience, because we all know how very open to dispute a reported cure of a mental disease is. Nevertheless, these people by very careful scientific data have attempted to establish the fact that the patient was sick in the first place and that he was well in the second place. That, it seems to me, is proper scientific method.

Why the administration of thyroid brings about recovery, the essayists did not attempt to state, which I think is also to their credit. I think none of us has the slightest idea, except that we do know that the alteration of certain somatic factors appears to favor the reversibility of these psychic disintegrations. What these factors favoring reversibility are, we know only very charily.

If one were to attempt to find fault with the paper, which I think is possibly not even in order, it might be upon the assumption that the patients selected were otherwise "hopeless" cases. When one attempts to say that a certain group of schizophrenics has an undoubtedly bad prognosis, he is on very shaky ground. Some of the cases which certainly look the darkest sometimes recover spontaneously, and some of the cases which we expect to recover by all of the signs, do not recover. I think it is doubtful if we have

a right to say that a case is not likely to recover and assume that the thyroid administration was the only factor in that recovery. I do not want to throw cold water on the idea, I think it is encouraging, it is theoretically interesting and practically important. Nevertheless, I think we should warn the readers that psychiatrically speaking we are not prophets, and a definitely bad prognosis, even in schizophrenia, is just as difficult as a definitely good one.

Dr. Hoskins (Closing).—We are quite in sympathy with Dr. Lewis' suggestion that it is desirable to understand the schizophrenic reactions as a whole. Attempts to do this, however, are more conducive to exercise of the verbal habit than helpful in doing anything for the patients. The value of therapeutic measures must be determined inductively and that is the thing which we have been attempting in a modest sort of way to do. We recognize, of course, that dementia præcox is a complex of vicious circles. What is cause and what is effect, we have not much idea. Whether the thyroid as such has cured any patient, we are doubtful. The most that we had hoped to do in initiating this work was to render the patients more accessible.

Dr. Menninger ascribed to us more courage than we actually have. We carefully refrained from saying any patients had been "cured." What we did say was that the patients had improved enough to have been sent home. That is as far as we care to go on that point.

We also, of course, are aware of the difficulties of prognosis in this field. The prognoses recorded, however, were made in general by the same psychiatrists in both the control and the hypothyroid groups and are equally significant in both. Forty-one cases as against 18 do not exclude the "long arm of coincidence." Such studies as this, whether dealing with thyroid therapy, psychoanalysis or what not, are and must be fundamentally statistical, hence all technical requirement of statistics must be met. Before drawing final conclusions we must have an adequate number of cases. The material must be subject to partial correlations and all the other devices which statisticians have evolved to prevent one's being led astray, but it must be kept in mind that no statistical method will put anything into the data which is not there initially.

One point deserving of stress is the matter of dosage. Schizophrenic patients in most cases have a remarkably high tolerance for thyroid substance. Now and then one will meet a patient who is fairly normal in this respect, but we have given up to 60 grains of Armour's desiccated thyroid a day over a period of two weeks; 30 or 40 grains for weeks are not uncommon dosages. Such quantities in ordinary patients would be highly toxic. In some instances we have had to shift to pure thyroxin to get an effective reaction.

If the dosage is controlled by basal metabolic rate and pulse rate determinations no significant injury of the patients need be anticipated. On the basis of our work and that of others reported in the literature successful results can be secured usually only when relatively large doses are used.

REPORT OF THE MAYOR'S COMMITTEE ON DRUG ADDICTION TO THE HON. RICHARD C. PATTERSON, JR., COMMISSIONER OF CORRECTION, NEW YORK CITY.

Letter of Transmittal.

Honorable Richard C. Patterson, Jr., Commissioner of Correction, Municipal Building, New York City.

My dear Commissioner: The members of the Mayor's Committee on Drug Addiction take great pleasure in transmitting to you herewith a report of their activities. In transmitting the report we feel that we should review briefly the facts which led up to the making of this study, which is reported upon herewith.

Very shortly after the discovery of the alkaloids of opium and their value in the treatment of disease, it became evident that many persons would become addicted to the use of these drugs. This has also been true in the case of cocaine. The continued use of these drugs has caused corrective measures to be employed to combat the illegal sale of them so that no one could obtain them except for use on a physician's prescription or in laboratories. The craving for these drugs is very intense amongst drug addicts and the profit in illicit sale is enormous so that it is not possible to completely prevent the sale.

It has been known for a long time that it was extremely difficult to break a chronic drug habitué from his habit and, as in the case of many chronic diseases, many so-called cures have been heralded.

In the City of New York with its enormous floating population and with many individuals of the criminal class, drug addiction has been widespread, but its extent, at best, can only be estimated.

Several years ago, a widely heralded cure for the treatment of drug addicts prompted the Department of Correction to make use of this remedy for the treatment of addicts placed under its charge as misdemeanants or felons. Many physicians interested in the problem felt that this particular drug, narcosan, was of value, but, on the other hand, there were many reports in the medical journals and many private statements made by physicians that it was valueless.

This entire subject was under some discussion during the period of incumbency of your predecessor, but in 1927 you recognized the magnitude and importance of this problem and you were convinced that it would be extremely advisable to have a study made of the various methods of treating drug addicts during the period of withdrawal. With this conviction in your mind you recommended to the mayor that a committee be appointed and that such a study be made by a representative committee of physicians. The mayor of the city, the Honorable James J. Walker, who has always been interested deeply in furthering and improving the care of the sick as well as other city charges, was also convinced of the necessity of such a study and recommended to the Board of Estimate that an appropriation be made to defray its cost.

There was then appointed a committee of physicians consisting of Dr. William R. Williams as Chairman, Stanley R. Benedict, Israel Strauss, Thomas A. McGoldrick, Menas S. Gregory, Alexander Lambert, George B. Wallace and Linsly R. Williams as Secretary. Dr. William R. Williams was forced to resign after a few weeks on account of ill health and Dr. Alexander Lambert was elected Chairman. The Commissioner of Health of the State of New York, Dr. Matthias Nicoll, Jr., and the Commissioner of Health in New York City, Dr. Louis I. Harris, and later Dr. Shirley W. Wynne, were advisory members.

It was not a very simple matter to arrange for such a study, requiring, as it did, the most complete control over the patients who were being treated so that there should be no possible leakage of drugs which would vitiate the study. It was also difficult to find the proper hospital facilities where such control could be carried out. This required the cooperation of the Department of Correction, the Magistrate's Court, the Board of Trustees and the Superintendent of Bellevue and Allied Hospitals, and in particular, of the Director of the Psychiatric Service, Menas S. Gregory. Fortunately, all of the individuals concerned were deeply interested in the question and with the appropriation of $24,000 by the Board of Estimate, it was possible to employ a special staff of physicians and nurses.

The committee was also fortunate in being able to secure the services of Dr. Charles Schultz, upon whom developed the routine work of following out the various treatments and reporting upon

them. An ingenious method of recording the symptoms was formulated by him and Dr. Gregory and at the expiration of nearly two years of work it has been possible to render the following report on a series of 318 patients who were treated.

Every treatment which offered any possible prospect of giving relief during the period of withdrawal was tried and the report gives in adequate detail the various measures used and their results.

The report definitely states that at the present time there is no specific for treatment during the period of withdrawal, but indicates the most satisfactory known methods of handling patients during this extremely trying period.

It is clear that the individual who is a criminal and has been convicted for misdemeanors or felonies is a far different person to deal with than the individual who is convicted of the single misdemeanor of being in possession of one of these drugs.

Many difficulties arise as a result of treatment because of the differences between these two main groups, and there are also greater difficulties in the general problem of the rehabilitation of the drug addict after the successful withdrawal treatment. A statement of these difficulties and the problems of rehabilitation are included in the report.

We hope that the report of the committee may be of some service to the city in promoting care and management of this unfortunate group of individuals, and in conclusion we wish to express to you our hearty appreciation of the cooperation which has been rendered by you and the members of your staff. We also ask you to express to his Honor, the Mayor, our appreciation of his interest in this study, and to the members of the Board of Estimate for their willingness to appropriate the money necessary for this study.

Sincerely yours,

ALEXANDER LAMBERT, *Chairman,*
STANLEY R. BENEDICT,
MENAS S. GREGORY,
THOMAS A. MCGOLDRICK,
ISRAEL STRAUSS,
GEORGE B. WALLACE,
LINSLY R. WILLIAMS.

Organization.

On assuming charge of the Department of Correction of New York City in 1928, Commissioner Richard C. Patterson, Jr., in his survey of the department, found that the management of drug addicts was one of the problems confronting him. Approximately 1500 drug addicts come under the supervision of the department annually, and there had been no systematic or uniform method of handling these cases in the departmental divisions in which they were distributed. Accordingly, and with the approval of Mayor Walker, a committee, known as the Mayor's Committee on Drug Addiction, was appointed in November, 1927, to study the subject of drug addiction, and make such recommendations as their findings warranted.

The personnel of the committee is as follows: Dr. Alexander Lambert, Chairman, Drs. Stanley R. Benedict, Menas S. Gregory, William R. Williams, Thomas A. McGoldrick, Israel Strauss and Linsly R. Williams. Dr. Matthias Nicoll, Jr., State Commissioner of Health, and Louis I. Harris, City Commissioner of Health, served as advisory members. Originally the committee was organized with Dr. William R. Williams as Chairman, but in September, 1928, Dr. Williams was compelled to resign from the committee on account of ill health; Dr. Lambert succeeding Dr. Williams as Chairman, and Dr. George B. Wallace was added to the committee. On Dr. Harris' withdrawal from the Health Department, his successor, Dr. Shirley Wynne, became an advisory member.

In outlining its work, the committee considered it a matter of primary importance to establish a satisfactory method of treatment for the withdrawal period of drug addiction. The commitments of those coming under the charge of the department are in general for a period of three months, and the immediate problem is to stop the taking of the drug of addiction as promptly as can safely be done. In addition to this phase of the subject, however, it was planned to obtain useful information concerning the physical and mental status of the drug addict, and finally to examine into the practicability of carrying out a rehabilitation treatment toward the end of making a useful individual out of the addict.

For the study of the treatment of withdrawal symptoms, one of the wards of the psychopathic division of Bellevue Hospital, with a capacity of 17 beds, was turned over to the committee. A full-

time medical staff, consisting of Dr. Charles Schultz, assistant alienist at Bellevue Hospital, in charge, with Dr. Sidney Halperin, and later Dr. Bernard Raginsky, as assistant, was appointed, together with an adequate number of carefully selected nurses and keepers. Each patient was kept under continued personal observation. The patients studied, all males, were addicts committed voluntarily by a city magistrate, usually Chief Magistrate McAdoo. The hospital study began on May 28, 1928, and continued until May 15, 1929. During this period, a total of 318 addicts were studied. The committee held weekly conferences and rounds were made daily by one or more of its members, including the chairman. In this way it kept in constant touch with the work going on.

A complete case record was made for each patient admitted. This included a full history and physical examination, a psychological grading, routine laboratory findings, and in certain cases extensive blood analyses. The symptoms occurring during the stay in hospital and the results of treatment were recorded in detail.

As a result of the carefully planned and executed system employed it is believed that the data obtained are as reliable as may be hoped for in a study of this sort. A full account of the work done in the hospital is given in the report of Dr. Schultz, with the supplementary reports of Dr. Benedict, of Dr. Neuwirth, and of Drs. Gregory and Strauss. These reports are appended.* What immediately follows is a summary of the facts brought out.

Results of Hospital Studies.

As has been stated, the number of patients treated was 318. All were males, and eight of these were negroes. The youngest was 19 years old, the oldest 75. Approximately one-half were between the ages 30-39, over one-fourth between 20 and 29 years. 83% admitted criminal records, about half of these having been arrested because of possession of narcotics. Among the remainder were records of conviction on such charges as larceny, burglary, assault, carrying concealed weapons and homicide. 230 had received a

* The reports of Dr. Isaac Neuwirth on Magnesium and Calcium Metabolism and the Use of Magnesium Sulphate in Narcotic Withdrawal, and of Dr. Stanley R. Benedict on The Blood Chemistry of Chronically Addicted Morphine and Heroin Addicts and an Analysis of Narcosan are omitted from this publication of the report and may appear elsewhere. Abstracts are contained in this report.

public school, and 64 a high school education, while 18 had attended college. Six had no schooling.

At the time of admission heroine was the drug most commonly used, 263 cases. Morphine was taken by 31. It is interesting to note that cocaine, taken with either heroine or morphine, was recorded in but four instances. The period of addiction varied from 1 to 50 years with about one-half of the cases giving a history of addiction for more than 10 years. Only 39 of the addicts stated that they had taken no treatment to stop the habit. The remainder had taken the reduction or abrupt withdrawal treatment, or one of the several so-called specific treatments on one or more occasions. Over half had undergone one or another form of treatment on four or more occasions. In over one-fourth of those having treatment, the longest period of abstinence from the narcotic was less than one year.

The patients, on admission, varied considerably in regard to their general physical condition. About half of them were recorded as well-developed, fairly well-nourished and with no evidence of organic disease. Of the remainder, all were poorly nourished, and a third of these showed definite organic deterioration or disease. Practically all showed a marked neglect in personal hygiene, in regard to clothing, general body cleanliness, care of the teeth, etc.

In the detailed physical examination, it was found that 18 of the group had active or quiescent pulmonary tuberculosis. Out of 285 examined 15 had a positive Wassermann test. In general, the circulatory organs showed no abnormalities, although the blood pressure was usually at the lower limits of the normal figures. The blood count, blood nitrogen and blood sugar were within the normal range, and the urine examination was negative except in a few instances. Examination of other organs was negative, except for the skin scars and abscesses which resulted from hypodermic injections.

Since it has been claimed that narcotics materially alter the condition of the vitally important cell lipoids, and one method of treatment has its theoretical basis on this assumption, a very thorough study of this phase of the subject was carried out under the direction of Dr. Stanley R. Benedict. The conclusions reached are as follows: (1) Figures obtained for plasma total lipins, total fatty acids, cholesterol, phospholipins and phosphorus on drug

addicts during addiction have been found to be within the normal range. The lactic acid and total solid values in whole blood have also been normal. (2) No alteration was observed in the values of total lipin, total fatty acids, cholesterol, phospholipins and lactic acid obtained from addicts during addiction and following short periods of treatment.

A study of calcium and magnesium blood content was made by Dr. I. Neuwirth. During the period of addiction and of withdrawal the concentration of these substances in the blood was within normal limits.

Since the results in the treatment of drug addiction are very intimately related to the personality and mental make-up of the addict, a study of the mental status of all patients admitted was carried out. With no knowledge of the status of the patients prior to addiction, it is of course impossible to state with certainty what part of the existing states was due to the continued taking of the narcotic and what part was present before addiction began.

Using Bleuler's classification of fundamental reaction types, 41% were classed as schizoid types, 30% as syntonoids and the remainder as mixed types. The majority of the patients were found to be of average intelligence, and less than 5% appeared to be mentally inferior, of the high grade moron type.

In the grouping according to personality types, about 13% were considered of normal personality, 30% were border-line cases and over 50% were considered constitutionally psychopathic. In this latter group were included emotional instability, 20%; criminalism, 13%; and paranoid personality, 9%. A full discussion of this phase of the subject is given in the appended report of Drs. Gregory and Strauss.

From the data given in the preceding pages it is seen that the 318 addicts studied belong to the class known as the " underworld." They had all been taking addiction drugs over a considerable length of time, and very few would be considered useful members of society. They had all made efforts to break the habit by means of so-called " cures "—many times in some instances, with only temporary periods of abstinence as a result. Physically they showed no evidence of any appreciable damage done by the drug of addiction, and rehabilitation from the physical standpoint would present no great difficulty. On the mental side however the matter

is different. Over half of them were classed as psychopathic. Lacking emotional values and control, they had no true conception of their difficulties, and were actually antagonistic toward efforts to rid them of the habit. These factors will be discussed more fully later on under the subject of rehabilitation.

Comparative Study of Treatments.

In order to evaluate any particular course of treatment of the withdrawal symptoms in drug addiction, it is necessary to have some fairly clear-cut standard for comparison. The most obvious standard in this instance would be that obtained by the study of the type and intensity of the symptoms which occur when the narcotic is abruptly withdrawn from the addict. It must be pointed out, however, that no two addicts behave precisely the same on abrupt withdrawal. The mental make-up of the patient, the length of the addiction period, the local environment, and other factors influence very greatly the range and intensity of the symptoms. It was necessary therefore to pick out and study those symptoms which commonly occur, that is, are present in practically all instances, and which allow of grading as to intensity. Secondly, it was essential to have an adequate number of patients for the establishment of the desired standard or control.

The number of patients used in obtaining the standard was 100, and the symptoms taken as giving the best index of the actual condition were: (1) Gastro-intestinal symptoms, consisting of nausea, vomiting, abdominal cramps and diarrhœa; (2) muscular symptoms, consisting of aches and twitchings; (3) restlessness, both physical and mental; (4) prostration, subjective and objective. Each of these symptoms groups was recorded as absent, moderate, marked or excessive. The course of the symptoms on withdrawal is as follows: in a few hours psychic symptoms appear, restlessness, uneasiness, anxiety, irritability, within 12 to 18 hours the physical symptoms begin: gastro-intestinal, muscular and a legion of others, reaching a maximal intensity at the end of 24 hours. This peak is maintained for 24 hours after which the symptoms subside, so that at the end of 72 hours, or at most 96 hours, they have practically disappeared.

All symptoms of abrupt withdrawal were noted, but the four groups mentioned formed the chief basis for comparison of the

efficacy of any treatment investigated. It may be pointed out that in obtaining this standard, alternate patients were used, they were kept in ignorance of the procedure adopted, and placebos were given routinely. Following the withdrawal period comes a stage of recovery or convalescence, careful records of which were also kept and used as a basis for comparison.

The first study of special forms of treatment was on narcosan.

Dr. S. R. Benedict of the committee made an analysis of Narcosan and reported as follows: As Narcosan, the so-called "Lipoidal treatment for drug addiction" was used on the Bellevue ward, an analysis of it was made on a fresh sample obtained from the manufacturer. This drug has been described as a solution of lipoids, non-specific proteins and water soluble vitamines. The lipoids are extracted from soy beans and cotton seeds by extraction with hot alcohol, the non-specific proteins from alfalfa seeds or Hungarian millet by extraction with highly dilute hydrochloric acid. The hot alcohol extracts both fat and lipoids, the fats being separated from the lipoids by a process of saponification.

The lipoids in Narcosan have the chemical affinities and reactions similar to those of "sphingomyelin."

The total solid content of Narcosan was found to be 0.713%. Special attention was directed to the phospholipin and protein content, as Narcosan was described as a mixture of these substances and vitamines. In the 48 c. c. of Narcosan which represent a complete treatment, 5.38 mg. of phospholipin and 21.4 mg. of protein are present. It has been claimed that the lipoids of Narcosan have the chemical affinities and reactions similar to those of "sphingomyelin" and that "the fats are separated from the lipoids by a process of saponification." One-third of the total solid present in Narcosan was found to be the form of total lipin. Only 0.5% of this is in the form of phospholipin. The proteins in Narcosan were not precipitated by trichlor acetic acid, and so are in the form of the intermediate products, as is to be expected after acid hydrolysis. The slight acidity of Narcosan may account for the stinging sensation, felt on injection.

Of the total solid content of 7.13%, it was found that 1.67% is phospholipin, 6.5% is in the form of the intermediate proteins, 32% is in the form of fat, fatty acids, and cholesterol (total lipin minus phospholipin), 19% is in the form of carbohydrate and 13% is inorganic material.

Sixty-eight patients were given this treatment, which was carried out at first according to the directions of Drs. Lambert and Tilney and later with some modifications of their method. The results of this study, which was briefly reported in the *Journal of the American Medical Association,* January 12, 1929, are as follows: (1) Narcosan is not a specific for drug addiction. (2) It did not alleviate any of the withdrawal symptoms, but on the contrary in all, especially the gastro-intestinal group, they were more severe than those in the control or untreated group. The combination of abrupt withdrawal and severe gastro-intestinal symptoms incidental to narcosan treatment involves danger to life in addicts who are aged, ill-nourished and suffering from pronounced organic disease. (3) There is no obliteration of the craving for narcotics following narcosan.

Since many of the specific treatments of drug addiction have as their basis some form of belladonna, a study was made of the effects of the active principles of this plant, namely atropine and hyoscine.

Atropine was given to 25 patients through a 48-72 hour withdrawal period. It was given as the sulphate by hypodermic injection, in the following dosage: a first injection of 1/100 grain, followed by three injections of 1/200 grain at two-hour intervals, after which 1/200 grain was injected every four hours. This dosage was sufficient to cause dryness of the mouth and difficulty in swallowing. Compared to the standard, the atropine was effective only in lessening to some degree the diarrhœa. On the other hand, the restlessness was more marked, amounting in some cases to delirium, and the prostration somewhat longer in duration.

Hyoscine was also given to 25 patients, a lævo-rotatory hyoscine bromide obtained from Merck and Co. being used. It was given by injection 1/400 grain every four hours for four doses, and thereafter every six hours until withdrawal symptoms were over or delirium appeared. The results from hyoscine were similar to those from atropine; a slight lessening in the diarrhœa, but no amelioration of the other symptoms. Restless and prostration were more marked, and 15 of the 25 patients showed symptoms of delirium.

Neither atropine nor hyoscine can be considered as specifics therefore in regard to amelioration of symptoms; nor do they stop the craving for narcotics after the withdrawal stage.

A considerable number of substances which are depressant to the central nervous system, and might be considered as substitutes for addiction narcotics were studied. Among these were chloral hydrate, luminal, allonal, allyl iso-propyl-barbituric acid, veronal, trional, paraldehyde, neo-paraldehyde, bromides, aspirin, pyramidon. When taken by stomach they were very frequently vomited, and seemed to add to the gastric irritation. In moderate dosage they were without appreciable effect, while in large dosage there was frequently seen an ugly and unreasonable mental state, often associated with an insomnia. They fail as substitutes because they do not have the inherent properties of action which characterize the opium group.

A special study was made of the effects of two other substances, magnesium and amytal. These drugs are strong depressants of the nervous system, in fact they may be used as general anæsthetics, and it was hoped that they might be given in dosage sufficient to produce a moderate narcosis during the entire withdrawal period.

Magnesium sulphate was given to 48 patients. In the beginning the dose was 2 cc. of a 50% solution, injected intramuscularly at frequent intervals. There was no evidence of relief from these injections, and the patients complained of the sensation of burning and pain in the injected areas. Later on, still using a 50% solution to which procaine had been added, the amount injected was increased, in eight patients reaching a dosage of 0.25 gram magnesium sulphate per kilo weight of patient. This dose raises the serum magnesium content to 5 or 6 mg. per 100 cc. of blood, at which level it may remain for four to five hours. This level may be maintained by subsequent injections of 5-10 cc. if given every four hours. It was found that when the blood concentration was 5 mg. or more magnesium per 100 cc., relaxation and absence of restlessness occurred. When the concentration was below this figure, the symptoms returned in full intensity. When magnesium was given by mouth, as the chloride, no relief was discernible. It would appear that intramuscular injections of magnesium sulphate in dosage sufficient to maintain a serum level of 5 mg. or more per 100 cc. materially ameliorate withdrawal symptoms. However,

the local disturbance at the point of injection was such as arouse great objection on the part of the patients and the treatment was abandoned as being impracticable.

Amytal was given to 12 patients as a sodium salt supplied by the Eli Lilly Company. It was injected in one patient intravenously, in another by intramuscular injection, and was given orally to the remaining 10 patients, acting similarly in all instances. The initial dose ranged from 5 to 22½ grains, 5 grains being the minimum effective dose, and 22½ grains being considered the maximum safe dose. The largest quantity given any one patient during the withdrawal period was 67½ grains, the average amount in the 12 cases being about 40 grains. A single dose produced usually a state of sleep, and if 15 grains or more were taken a condition approaching surgical anæsthesia was induced. In four to six hours however the patients awakened and showed marked restlessness. Subsequent administration failed to noticeably abate the restlessness, and in fact seven of the patients became delirious and had to be forcibly restrained. Except during the sleeping period the withdrawal symptoms were present in full intensity, prostration was definitely increased, approaching collapse in two cases and the whole management of the patient became more difficult. It was concluded from this study that amytal is useful only when given in a single dose for the purpose of inducing a temporary state of quiet.

In view of the unsatisfactory results observed in the studies described, a study of what is known as the reduction treatment was made. In this treatment the drug of addiction is continued but in progressively decreasing dosage until a zero point is reached. Two groups, each of 25 patients, were used for this study. In one a period of seven days, in the second a period of 14 days, was allowed for the complete withdrawal. Before starting the treatment the daily ration of morphine sulphate required to maintain a state of comfort in the patient was determined. In most instances 3 grains of morphine sulphate daily were sufficient, a very few required 6 grains.

In the seven-day reduction treatment a solution of morphine sulphate was prepared usually of the strength of ¼ grain to 7 minims, and an aliquot part of the daily ration injected every four hours. On each succeeding day the dosage was decreased by 1/7 of the beginning one.

In the 14-day reduction treatment the same procedure was employed excepting that the daily decrease was 1/14 of the beginning dose. At the end of the 7- or 14-day period, injections of saline were given until all withdrawal symptoms were over.

In the seven-day reduction symptoms of withdrawal appeared in each instance, but their severity was less than half that of the standard. The patients were able to take sufficient nourishment to maintain their strength and weight and their convalescent period was much shortened.

In the 14-day reduction also withdrawal symptoms appeared, but these were still less marked. In the majority of instances, 21 out of the 25, the withdrawal symptoms were recorded as "light"; that is, there was no striking mental or physical discomfort. It may be pointed out here that in none of the 50 patients was there any sign of collapse or other alarming condition.

From what has just been said, it follows that the reduction treatment, especially if carried out over a period of 14 days or more, is the most humane, in that it involves the least suffering. It is also the safest as regards danger to life, and can be used in any case of drug addiction.

One study was made along this line of a rapid reduction of morphine and a more gradual reduction of codeine given with the morphine. Morphine, ¼ grain, was given every eight hours, each day the dose being ½ that of the preceding day, and stoppage occurring on the fourth day. Codeine phosphate was given in 5 grain doses every eight hours for four days, alternating with the morphine, so that an injection of one or the other was given every four hours. On the fifth day when the morphine was discontinued codeine was given every four hours in 5 grain doses, on the sixth day in 3 grain doses and on the seventh day 1 grain doses. It was then stopped and saline injections substituted until withdrawal symptoms were over. The results of this treatment seemed somewhat better than those of the seven-day morphine reduction one, but not as satisfactory as the 14-day reduction.

There were certain general measures routinely employed to add to the patients' comfort which may be briefly mentioned. On beginning treatment a catharsis is desirable. Severe purgation is undesirable as it may lead to intensification of intestinal symptoms. A moderate catharsis, such as induced by two compound cathartic

pills, an ounce of castor oil, or ½ ounce of Epsom salts, gave the best result. The diet was carefully selected to allow of adequate nourishment with the least bulk. There is often a craving for sweets, which was gratified. During the period of nausea and vomiting, fruit juices were most apt to be retained. Alkalies in the form of sodium bicarbonate, 30 grains every four hours, were useful in combating the mild acidosis present. Bismuth subcarbonate seemed to be of some slight help in lessening the gastro-intestinal symptoms. Massage, hot baths, and local heat were of use in relieving muscular symptoms and producing mental distraction. These and other similar measures, while they may offer some relief, did not however very materially check the intensity of the symptoms.

In cases of dangerous prostration or collapse the best procedure was to administer adequate doses of morphine, with an accompanying ½ or an ounce of whiskey. Adrenalin was useful in strengthening the circulation, but caffeine, strychnine and digitalis were found to be of doubtful value in these cases.

Finally proper encouragement, suggestion and mental distraction were helpful in lessening the patients' anxiety and making them more cooperative.

SUMMARY.

In summing up the results of the work done at Bellevue Hospital, the practical conclusions concerning treatment of the withdrawal stage in narcotic addiction are as follows:

1. None of the substances forming the basis of the so-called specific cures for drug addiction brings about amelioration or shortening of withdrawal symptoms.

2. Depressants of the central nervous system are ineffective or impractical as substitutes for opium derivatives.

3. The quickest and simplest method of stopping the addiction is that of abrupt withdrawal of the narcotic taken. Among the advantages of this method are the shortness of the time involved, three days as a rule, the avoidance of any complicated system of medication, an easier prevention of the addict surreptitiously obtaining narcotics during the period, and finally a very impressive mental effect on the addict with a striking feeling of relief when the withdrawal stage is over. The disadvantages are the suffering

involved, mild in many instances but very severe in others, and the prostration and collapse, which may cause death. As has been pointed out the abrupt withdrawal treatment should be limited to those addicts who on careful examination are found to have no serious organic degeneration or disease, are not of advanced age, and are not suffering from marked malnutrition.

4. The most humane form of treatment is that of giving progressively decreasing doses of morphine. Two weeks at least should be allowed for this reduction treatment. The advantages of this method are the absence or great diminution of severe suffering and its safety as regards collapse and danger to life. The disadvantages are the time involved, the absence of the favorable psychological effect of the abrupt withdrawal, and the greater and more prolonged vigilance required to prevent the addict obtaining his narcotic.

With this summary, the committee recommends that all addicts undergoing treatment be under capable medical supervision, that those whose general condition warrants it be subjected to abrupt withdrawal, and that those not included in this class be given the reduction treatment.

Rehabilitation.

It has been pointed out that no form of treatment for withdrawal of addiction narcotics is in itself capable of stopping the drug craving. Sooner or later the desire returns in full force and addiction again occurs. A withdrawal treatment by itself therefore is only an administrative routine, to be carried out as often as the addict receives a court sentence and with no probability of bringing about a lasting abstinence. The real problem is that of ridding the addict of his habit permanently or at least over a long period of time. There is unfortunately no practical method known which, applied to those addicts coming under the supervision of the Department of Corrections, would accomplish the desired result. Various attempts at rehabilitation have been made in the past and are being made at present, and an account and critical analysis of these is found in the appended report of Rehabilitation by Dr. Lambert. But while much may be learned from these attempts, it is evident that a new plan must be developed to meet local conditions.

In carrying out a study of rehabilitation in New York City, certain basic principles may be laid down. The end in view is to

bring about an adjustment of the addict to an environment which allows him to maintain his self-respect and become of use to the community; in other words, to end his being a continued expense and even menace to the city, and make him a self-supporting, productive citizen. To secure such a result, it must be assured that the addict has learned a trade or line of work through which he may be self-supporting, that a position be found for him when he is prepared, that his progress for a number of years be supervised and checked up through some form of parole, and finally that he be brought to a state of mind whereby he becomes cooperative and honestly desires to be permanently free of his habit. It is clear that this accomplishment is a matter of great difficulty. A large percentage of addicts are psychopathic, a large number oppose any effort at rehabilitation, very many prefer the up and down life of addiction to the more monotonous one of steady labor. It would seem possible however through a short period of observation to eliminate those from whom nothing can be expected in way of rehabilitation, and to select and work on those who give promise of a successful result. How many there would be in this latter group is problematical, but it is probable that there could be added to it a considerable number of individuals who are beginners in drug addiction or whose acts have not brought them in contact with the police.

The personnel of the staff in charge is a matter of prime importance. It should be headed by a man of broad understanding of human character, eager for the success of the experiment, and willing to devote several years to the work. Such men are difficult to find and much effort must be made to select the right one. A follow-up staff, of the type of social worker, is equally important to carry out supervision of the addict after discharge from the institution.

A location for carrying out the first steps for rehabilitation would have to be selected with great care. It should be isolated to the extent that the smuggling in of narcotics can be prevented. It should not however carry the impression of a prison, but rather that of a sanitarium. There should be all necessary equipment for occupational therapy and training, and for other features of the general plan.

There would have to be some arrangement made whereby the addicts would not be free agents until finally discharged. This

means a binding commitment of some sort over a period of years in the case of those in whom a favorable prognosis is made and the privilege of discharging at any time those from whom no good results can be expected.

The successful carrying out of a general plan as outlined involves not only great difficulties on account of the character of the work with its innumerable details of organization and administration, but also a very considerable expense as well. It might even be advisable therefore for the city not to attempt to carry it out by itself, but to cooperate with some outside group, which has a rehabilitation scheme on its program. The city's share would be supplying the location and buildings, and arranging for the commitment of the addicts, the outside groups, the financing of the treatment, and supplying the personnel. It would seem that some such arrangement as this would give most promise of success. It is understood that any plan for rehabilitation would be of the nature of an experiment. It must of necessity be sufficiently elastic to allow of frequent alterations and in fact will vary in detail according to the individual addict. Until it is clearly outlined, until the necessary conditions of the experiment are satisfied, and especially until a thoroughly qualified man is found to conduct the work, it would be useless to attempt it. But if carried out in a proper manner, it would bring out facts of very great value and throw light on many problems which challenge present-day civilization.

The committee desires to express its appreciation of the work done by Dr. Charles Schultz, who ably and conscientiously carried out the work under direction of the committee.

The committee feels unable to close its report without an expression of its sincere appreciation of the whole-hearted cooperation and unflagging interest shown by Commissioner Patterson in the solution of the problems.

Psychiatric Aspect of Drug Addiction.

(As Based Upon Observation of the Cases Treated by the Committee.)

The psychiatric study was of necessity very limited in its scope since the majority of the patients treated came from the so-called "underworld." These individuals are, as is well-known, very unreliable in their statements, and since most of our information

was derived directly from the addict, there was obviously great difficulty in obtaining reliable data as to the antecedents, the environment, as well as objective evidence of the personality make-up. It is therefore important in recognizing the limitations of this investigation, not to interpret the data obtained as being necessarily true of the class of drug addicts in general. One may feel that every drug addict is influenced in the formation of the habit by association with other addicts, and by the administration of drugs to relieve pain, but that underlying both these factors there is some deep psychological shortcoming, either intellectual or emotional, in the individual which leads him to succumb to the habitual use of the drug.

A classification of the addicts according to the fundamental reaction types of Bleuler known as " schizoids," " syntoids " and " mixed types " was made, and it was found that of the 318 patients treated 132 (41.5%) could be classed as schizoids; 97 (30.5%) as syntoids; and 89 (28%) as mixed types.

A classification according to Kretschmer's method showed that 167 patients (52.5%) were of the asthenic body build; 84 (26.5%) could be classed as belonging to the pyknic group; and 67 (21%) to the athletic physical constitution.

It is thus seen that the majority of the patients treated were handicapped by physical and mental inadequacies or abnormalities. Intellectually they were found to be the average for their social level.

The study of their personality make-up showed that the large majority was of the psychopathic personality type. There was a condition of inadequate personality in 96 (approximately 30%); emotional instability was evident in 65 (20%); 41 (31%) were of the delinquent type. It may here be noted that 265 (83.3%) of the patients, including those with psychopathic make-up, admitted having criminal records. Of these, 120 (45.3%) had been arrested only for the possession of narcotics; whereas 145 (54.7%) had been arrested for drug offenses as well as other crimes. Many of the patients who from their histories could be classified as having criminal traits, also showed marked emotional instability. There was a paranoid personality make-up in 29 (9%) of the patients; 26 (8%) showed nomadic tendencies; and eight (6%) gave evidences of sexual psychopathy. Of all the patients studied only 42

(13.2%) failed to reveal any striking character anomalies aside from their addiction as far as could be ascertained during the period of observation.

Thus it is clear that many of them resorted to the habitual use of narcotic drugs for similar psychological reasons as those by which other psychopaths use alcohol to excess; *i. e.*, as a means of sublimation on a narcotized level. It may be noted as a matter of interest that 40 of the patients gave a history of habitual use of alcohol prior to their drug addiction. Their stated reason for the later substitution was that the use of alcohol precluded them from certain occupations because it became readily noticeable, whereas they could use the drug for a long period of time without detection.

Many of the addicts while under treatment showed hypochondriacal, neurasthenic or psychoneurotic reactions. It is possible that in some cases these symptoms were secondary to the drug addiction. On the other hand, the addiction itself may have been an expression of a psychoneurotic attempt at adjustment. It is a known fact that the incidence of psychoses resulting from the use of opium or its derivatives is insignificant. Only one patient under observation suffered from an hallucinosis which was due to the use of morphine and atropine, and it may be that it was the latter drug which caused the psychotic manifestation. Nearly all the patients admitted subjective fears of oncoming psychotic symptoms when using cocaine to excess. Many developed delirious states during the withdrawal of this drug. It is well known that there is an increased tendency to delirium in the so-called cures for drug addiction and this is mainly due to certain poisonous drugs, such as hyoscine, atropine, hypnotics, etc., contained in these "cures." It sometimes also occurs that the patient becomes delirious when the drug is abruptly withdrawn. There was only one patient who suffered from acute hallucinosis, largely of the visual type, during abrupt withdrawal of the drug.

It must be remembered that psychoses may occur in drug addicts independently of the use of the drug, but are often mistaken for drug psychoses. Some patients claim that with the first use of the drug they experienced a subjective feeling of increased efficiency, as is the case in the use of other stimulants. It was shown, however, in our study that prolonged indulgence resulted in unmistakable evidence of habit and character deterioration, similar to that

seen in alcoholic deterioration. Such deterioration may undoubtedly be due in part to an accentuation in the addict of his inherent psychological shortcomings, such as emotional instability, inadequate personality, criminality, psychoneurotic reactions, sexual maladaptation, etc., as well as a blunting of their ethical and moral feelings. It is also clear that the habitual use of the drugs undoubtedly resulted in bringing out in many of the patients more or less dormant psychopathic tendencies, such as schizoid and antisocial elements in their make-up.

SUMMARY.

1. The majority of the patients were found to be individuals who were handicapped either physically or psychically or both; were asthenics (Kretschmer), schizoids (Bleuler) or psychopaths.

2. The personality and physical defects act as predisposing factors to the use of drugs in the attempt to compensate or adjust at the drug level.

3. Prolonged use of narcotics in many cases resulted in character changes of a deteriorating type, with a tendency to accentuate the fundamental constitutional defects.

4. In addition to the physical condition the prognosis as to the patients' ultimate rehabilitation depends in great measure on the integrity of the personality as well as on the environment.

5. This study cannot be considered as conclusive for addiction in general because of the class of addicts studied, the short period of observation and the lack of facilities for a thorough social investigation. It must be regarded only as an attempt to weigh the importance of the psychic factors operating in the causation of drug addiction.

REHABILITATION

The rehabilitation of the drug addict is an exceedingly difficult problem, and one which up to the present remains unsolved.

The Department of Correction cares for about 1500 a year of these patients under its custodial care, and temporarily deprives them of their narcotics. When discharged they go out, a few perhaps to reconstruct themselves, some to disappear, the majority to relapse, and return. The work of your committee shows that about one-eighth of them seem to be of average normal stable

personalities; seven-eighths are distinctly psychopathic, unstable individuals, who possessed their psychopathic personalities before they ever took morphine.

How many of this mass of stable and unstable individuals can be reclaimed with proper care and rehabilitation, can be brought from economic uselessness into self-support, it is impossible to say. It is the unknown problem, with the solution of which we have to deal.

For 20 years, since the United States in 1909 drew attention to the international situation in regard to opium, there has been an aroused public opinion against the spread of narcotic addiction through opiates in this country. At that time Germany first exported heroin to the United States, with the assurance that it was a non-habit forming drug and produced its stimulation and narcotic effects without danger of habit formation, such as was connected with other opiates.

Cocaine, though often so classified, is not a narcotic, but produces only an intense overstimulation, which when continued brings about the happy mental condition of firm conviction that its addict possesses the power to obtain the fulfillment of all his hopes and dreams. Cocaine 20 years ago was a very prevalent addiction.

In 1913 a law was passed controlling the manufacture, sale and distribution of cocaine, and its possession made a crime. The arrests made at this time disclosed the fact that heroin was the drug chiefly used among the narcotic addicts, and the courts were powerless to control the situation. A year later the Boylan Bill included in affirmative statutes both narcotics and cocaine in the endeavor to control and prohibit the spread and use of these drugs. These restrictive and punitive measures did not control the situation. They caused the courts to take cognizance of the crime of possession of these narcotics, and to place the responsibility for rehabilitation of these addicts on the penal institutions during the period of custodial care.

During the last 20 years cocaine as an addiction has ceased to be a problem, not that those addicted to it ceased to use it, but because of the punishment involved. Cocaine addiction when persisted in over a certain period brings with it its own swift punishment by the development of acute mental disorders, and the fear and horror of this condition prevents its use as an addiction, even among the pathologic personalities of the criminal classes.

At the present time it does not enter as a disturbing problem into the situation.

On March 1, 1915, the Federal Harrison Law went into effect, the enforcement in New York City of both the Harrison Law and the Boylan Law produced a situation by which the addicts crowded to the authorities in hospitals, courts and penal institutions for relief from their drugs, as they could not obtain them on the outside. To meet this situation the hospitals in the workhouse were enlarged, and many cases were sent through the Board of Inebriety to the state colony at Warwick, under the care of Dr. Charles F. Stokes.

In 1918 Dr. Stokes reported that in three or four years about 1000 addicts had passed through his hands at Warwick, but because of meager equipment, and lack of adequate assistance, he was unable to care for them as he desired. Dr. Stokes seems to be the first one who in routine institutional care definitely studied the addicts from the point of view of personality, and sought to rehabilitate the personality through work and psychologic reconstruction after the narcotic drug had been withdrawn. In the small number of 100 cases, he reported that the character of the addicts had been changed from their untrustworthy, undependable condition of heroin addiction to a condition of relatively normal personalities as shown by their industry, truthfulness and dependability.

Of these 100 he had been able to follow up only 37, and of these 32 were known to be at work, and doing well. The remaining 68% had in all probability relapsed.

At this time Stokes also mentions these young heroin addicts as averaging 22 years of age, in the early stages of their addiction, and being a most favorable group for rehabilitation, even with their short three months' period of custodial care.

But it is evident with 68% relapses, the meager equipment and inadequate assistance at Warwick could not prevent the introduction of drugs which destroyed his reconstruction efforts in all except the youthful, relatively stable individuals, and that success was only possible with this particular chosen type which under any and all treatments is prone to rehabilitate themselves.

The problem of rehabilitation of the psychopathic addicts had not been solved. He had appreciated the key to the situation of the abnormal inadequacy of personality, and the necessity of recon-

struction through work and psychologic reconstruction, but through inadequate equipment was unable to carry his treatment to a successful issue.

In 1916 the state legislature formed a committee for investigation and study of the narcotic situation under the chairmanship of Senator George H. Whitney. This resulted in the formation of the State Department of Narcotic Drug Control, which put into effect the minute restrictive supervision of apothecaries and physicians as a possible supply of narcotics to the addicts, and gave permission to the department to found narcotic dispensaries to deal further with the addict. It was further believed that the registration of the addicts would also control them. Several narcotic dispensaries were started in this state, the most active of which was under Commissioner Copeland of the Health Department of New York City. Some 7464 patients were treated at this dispensary, the methods of procedure being to furnish addicts with their narcotic at a reasonable figure, below the price that they would pay for it on the outside to the peddlers, thus endeavoring to put the peddlers out of business, and enforce a daily diminution of the supply of the narcotic to each individual addict. This was the principle of the ambulatory treatment, made illegal for the private practitioner by the Harrison Law, but believed at this time to be possible to be brought to a successful issue, if controlled under proper authorities. These dispensaries proved to be only great examples of the utter failure of the ambulatory treatment, the addict would not permit himself to be reconstructed by deprivation of his drug below physical and mental comfort, and could not be forced to do so. Only 23% of the addicts in this clinic were willing to go into the Riverside Hospital, some 1500 were treated there by the hyoscine treatment, and many of these seemed to have been able to reconstruct themselves, as they had in the experiment at Warwick. But there was no attempt made for rehabilitation beyond a short stay necessary for their withdrawal period, there was no social after care and reconstruction through work, and psychologic rehabilitation, and certainly no endeavor to reconstruct any psychopathic personality. These clinics also failed to solve the problem.

In that clinic 66% of the patients were under 30, and were taking heroin. There was still present among the addicts a large group inadvertently caught in the toils of a heroin addiction, in the belief

that it had not possessed the peculiarities of a habit forming drug when they first took it. This type of heroin taker has disappeared in the addicts to-day, since in the patients treated 10 years later by your committee it was found that only 29% were under 30. It seems therefore that here again the selected young, relatively stable group can easily be reconstructed when opportunity is given them, and they are freed from the physical poisoning of the drug. But the unstable psychopathic group still cling to their addiction, and go through relapse after relapse, unless the original cause of their narcotic addiction is removed. After two or three years the law forming the Department of Narcotic Drug Control was repealed, and since then in New York State the narcotic situation has been governed by the Harrison Law, until last year there was a narcotic state law passed supplementing the federal law. The whole endeavor therefore of the state has been to control the distribution and manufacture and sale of narcotic drugs, and to punish the possession of them as a crime, and to withhold adequate medical care and any serious endeavor for rehabilitation. This apparently has deterred certain average so-called normal individuals from going on with their addiction, not so much from the fear of punishment by the law, as from fear of the consequences, from the bitter condemnation by public opinion and custom in the community.

It is evident therefore that the solution of the problem of the psychopathic drug addict is not to be found in cutting off his supply of drugs, in endeavoring to restrict its use through punitive measures, or even making its possession a crime, and incarcerating him when caught breaking the law. These procedures undoubtedly act as a deterrent among average stable personalities, but not among the psychopathic personalities. These latter prefer the life of useless narcotism, varying between short periods of state care which enforces abstinence, and short periods of freedom in which they can balance their unhappiness during periods of abstinence with their contentment during periods of forgetfulness.

It will assist us in our discussion of the solution of the problem, if we study briefly the personality of the addict, as he occurs to-day, In the past a great deal of the care and treatment of the addict has been based on the supposition that he was suffering from a disease commonly called an addiction disease. The recent work in Philadelphia of Light and Torrance, after two years' exhaustive medical

study with the opiate addicts, has definitely shown that physically these addicts do not differ from the average normal person in the physiological processes any more widely than normal human beings differ from each other. This proves conclusively that the morphine addiction is not due to an addiction disease, nor is it a disease in the ordinary physical sense.

Nearly 90% of the addicts to-day are psychopathic personalities, not socially insane, but differing sufficiently from the average human being to be justly considered abnormal. They do not differ in kind, but only in degree from the mental perversions and psychologic distortions of the insane. They are defective in the emotional side of their personalities; all human beings differ very materially in their intellectual ability, and in their intelligence, and they differ just as widely in their emotional capabilities. But in the psychopathic personalities, as Bleuler emphasizes, even if there is an average or great intelligence, it has little regulating influence on the actions. The majority have been brought up under such social conditions that they have been intensified in their anti-social point of view, emotionally defective, and inadequately or improperly trained in emotional control, they fulfill the colloquial expression of having gone bad; they may be therefore said to live mentally in that tragic border land between mad and bad. These mentally unstable individuals obtain a keen mental pleasure from their opiate during the early period of their addiction, seemingly in direct ratio to the amount of their instability. They fall a ready prey to the seduction of morphine or heroin addiction, but they were psychopathic before they took the morphine, and they remain mentally unstable, not because of the morphine, but in spite of it, for certain of the very unstable types seem less disintegrated and unstable when under the morphine than without it.

These patients, as is well known, are extremely prone to relapse. The cause for their relapse is not the effect of the morphine previously taken, but from the same original cause under the influence of which they first acquired their addiction. They are the unhappy misfits of life, they are the misunderstood anti-social individuals who feel they have never had a fair chance, who never have been able to adjust themselves to their environment, who believe everyone is against them, and blame their so-called bad luck on everyone but themselves, or they are the periodic inebriates seeking forget-

fulness. The basis of narcotic addiction is the same as the basis of alcoholic drunkenness, both narcotics give the desired forgetfulness, but when free from their narcotic, these individuals are forced to face the bitter realities of life which they are unwilling or unable to do.

Trotter sums it up extremely well when he says the intoxication and narcotic impulses have been almost universally regarded as either on the one hand a sin or a vice, or on the other hand as a disease. There can be but little doubt that in fact it is essentially a response to a psychological necessity. In the tragic conflict between what he has been taught to desire, and when he is allowed to get, man has found in alcohol, as he has found in certain other drugs, a sinister, but effective peace maker.

The Western nations and the Japanese condemn the use of the opiates and condone the use of alcohol. Other nations condone opium and condemn alcohol; these differences of custom are in each country rigidly enforced and sustained without question by public opinion. All nations condone some form of narcotism, but regulate by custom the narcotic to be used.

The drug addict frequently comes voluntarily to be free of his addiction, and seeks continuously every sort of treatment, or so-called cure. Some do this that they may free themselves from their addiction to go back to the original keen mental pleasure they obtained when first taking the opiate; they are seldom conscious of the real cause of their narcotic desire; their wish therefore to be free from it is insincere and the result is consequently ineffective. They wish temporarily to be rid of their drug, and will bear the discomfort of getting rid of it, but the slightest emotional disturbance may upset them, and change the desire to be rid of it into one keen to return to it. Even if successfully off the physical symptoms of withdrawal, and entirely free from them, they feel lost and miserable without it, and soon are eager to return to it.

It is not common that the addicts shift from the narcotism of opiates to that of alcohol, or the reverse. The enforcement of the laws against one does not affect the enforcement of the laws against the other. Many of those addicted to the opiates however, use the difference between condemnation given to the drug addiction, and that given to the alcoholic as an excuse for their anti-social attitude and resentment. They thus justify their relapse and their general

social antagonism. They feel down trodden and abused, because the alcoholic drunkard is allowed to go free with a small fine, while the addict is severely punished for the mere possession of his narcotic. In the older addicts, especially the morphinists, the sense of physical comfort, and their physical feelings add greatly to their desire to relapse, and the long continued use of opiates disintegrates further their original psychopathic personality. Therefore any rehabilitation of short duration is necessarily ineffective. Another powerful influence in the relapse of addicts is the return to their old environment. Their social instincts in their youth when the youthful urge of experimentation and adventure was strong in them, when their inadequacy brought about a sense of inferiority, made them seek companionship to increase their sense of comfort and security. They therefore are unaccustomed to live except in the companionship of addicts, and their herd instinct is powerfully developed. They must be in the herd, and of it, since outside of it they are unhappy, and they feel that no one of their new companions understands them; and they naturally gravitate towards those whom they understand, and whom they feel understand them. Every addict for the sake of companionship, or for self-justification ceaselessly endeavors to make other addicts. If therefore one of them becomes free from his drug, he is almost certain to relapse if he goes back to his old environment.

In the small number of 318 addicts studied by your committee, there were noticeably distinct groups of personalities. A few of superior intelligence, others varying from average intelligent individuals through various degrees of abnormal personality, to those confirmed criminal and psychopathic individuals who cannot be redeemed back to stability and economic usefulness. There were 13% of those of average stable personalities, favorable for rehabilitation; there were 30% of inadequate personalities who seemed to have been the shiftless unsuccessful members of their families, never were adequately adjusted to their environment or their existence, and who if properly reconstructed and their psychologic distortions reconstructed, would bid fair to continue an average stabilized existence; especially if this could be done in the early stages of their addiction. There were 20% of those designated as emotionally unstable. The majority of these were unstable before using their drug, but under the use of it their personalities had

markedly disintegrated. The previous history of some of these individuals showed that they had been more stable before using the narcotic, and in some of whom the instability may have been secondary to the use of the drug; here again, if taken early in life, and separated from the confirmed criminal and unstable type, there remains a chance of rehabilitation. Many of these however, belong to the criminal type, and there were 13% in which the criminalism was so marked they were classified under this heading. The dominant feature of these personalities is the profound egotism and complete disregard of ethical issues, or their outside environment.

Considering all the addicts from another point of view, as is done more fully in another section of this report, we find that from their bodily structure the majority of them, 52½% were of the asthenic type; the weak jawed, narrow chested, delicately built group. In these as Kretschmer holds, the schizoid or tendency to dementia præcox is more prone to develop. These schizoid types of individuals find it difficult to adjust themselves to reality. They are supersensitive, shut in, unable to adjust their contacts with other people, exceedingly self-centered, they are selfish, and often cruelly indifferent to the effect of their actions on others, and yet resentfully sensitive when misunderstood.

This forms the type of individual which under the hard conditions of poverty easily grows into anti-social resentments, and easily turns into criminality. On the other hand, there were 30% of the syntonoid type, these form a type of personality much more favorable for reconstruction. There are more usually well integrated, and they are a type that is in contact with reality, and their emotions are vivid and suitable to situations. These formed 26%. There were 21% of mixed types of personalities which showed average individuals or others of no distinct type.

Even in the small number of addicts treated by the committee, we have a fair cross-section of the addict to-day.

The average so-called normal individuals who are addicts in the community at large, do not form a serious problem to solve; they have drifted for many reasons into the use of narcotics; public condemnation makes them realize the seriousness of their error, makes them eager to be free from it: They seek to rid themselves of it, and are often only deterred by dread of the physical suffering connected with withdrawal. Their personalities do not disintegrate

under the use of their narcotic, and their reliability and their truthfulness may remain normal, except when on the defensive regarding their drug addiction.

The problem of the average person who has through illness or through injudicious medication acquired the habit of taking narcotic drugs, from which they cannot free themselves, has very much diminished in recent years. It is believed among those who are dealing with narcotic addicts that this number does not exceed 5% of the total, and this normal group can easily be reconstructed if separated from the abnormal, and tend of themselves to rehabilitation if the opportunity be given. Many of them are unfortunately in such circumstances that the expense of hospitalization and medical care is not easily obtained for them, but if it were obtained they would be easily reconstructed. The medical addict so called, the one who has acquired the addiction only through medication, and the normal group, are medical problems and can largely be cared for through voluntary custodial care and hospitalization, and are cared for continually by the medical profession, but there are many who economically are unable to obtain this, and who turn to the authorities for aid.

In dealing with the reconstruction of large numbers of addicts, we must realize that the breakdown of a personality under strain and its reconstruction, is a problem peculiar to each individual, regardless of how large a mass of humanity may be classified together as belonging to a given group of those sick with disease, or defective mentally. The group cannot be successfully rehabilitated as a mass, but must be dealt with as individuals. With narcotic addicts especially, the causation of their addiction varies greatly, but does not differ as widely as the make-up of their psychopathic personalities. The routine treatment therefore, applied to them as a group, is certain to prove a failure in the majority of individuals.

Beside the attempts of reconstruction in this state, there have been attempts made in other parts of the United States; one at Shreveport, La., under the parish physician, Dr. Willis P. Butler, is worthy of mention. It is an excellent example of the successful management of a narcotic dispensary under the personal leadership of a physician peculiarly fitted for his work.

In 1921 to 1923 when the plan of narcotic dispensaries was being tried in the various states, one was founded at Shreveport, La.; it had the support of the state and local boards of health; it had the unquestioned cooperation of the police and the county medical societies. The method employed there was to separate the addicts into two classes, the curable and the incurable; to give the morphine regularly from a clinic, in just sufficient amount to keep the addict comfortable. These addicts were improved in health, cared for until able to go to work, and were thus placed on an economic basis of existence preparatory to the withdrawal of their drug. After a certain length of time, they were removed to a hospital, or the local jail, and taken off their drug, where the introduction of their drug to them, during this period, could be controlled. After the withdrawal, they were sent for convalescence into the country; they were closely watched and supervised by the police, and by special detectives to see that they did not deal with peddlers, and their existence was controlled. In the beginning there were 494 addicts, and in the first two years the number was reduced to 188. The addicts could obtain their drugs from the dispensary at six cents a grain; the peddlers charged them $1.00 a grain, the wholesale price of the drug was between two and three cents. As they were kept in drug balance until ready to be taken off their drug, there was no temptation to go to the peddlers, and the difference between what the addict paid for the drug, and the amount for which the dispensary could purchase it, made the dispensary self-supporting. The strict policing of the peddlers, the refusal of the drug stores and the physicians to treat the addicts except at the dispensary, forced the situation on the psychopathic incurable addict that he must play according to the rules, or go elsewhere, and they left the parish. The Narcotic Bureau of the Federal Government did not approve of this dispensary and closed it. At the time of its closure there were 101 cases being treated by Dr. Butler, many of those whom he classed as incurable were receiving small doses of morphine, leading decent lives, and supporting their families, but after the closing of the dispensary were forced back into poverty by their inability to obtain the drug except through peddlers. Other patients were forced into the state penitentiaries, and several of them died in the local jails, or in the jails of other cities. In a short time after

its closure, the old condition returned in Shreveport regarding the addicts. The Police Department and the sheriff reported they were having endless trouble again with the users, and the peddlers, and the petty crimes were increasing, and the peddlers were creating new cases. The dispensary was closed against the protest of the Medical Society, and against the protest of the local authorities. It apparently had solved the problem for that community regarding the addicts; it had not in every case permanently removed the narcotic drug from all the addicts, but under the personal care of a humane physician, the decision between curable and incurable had been fearlessly made, and the results had proven the wisdom of the decision, since under his charge the drug addicts, and the use of narcotic drugs had ceased to be a troublesome problem to the community.

Within the last year in the State of California an endeavor has been made to rehabilitate the morphine addict under state care. After the addict has been unpoisoned from his narcotic, there is an endeavor being made to build him up with work, and when seemingly rehabilitated to find an occupation for him, and follow him up through organized social care; the result so far seem to more than justify this experiment.

In 1928 the Porter Bill, providing two narcotic hospitals for the Federal treatment of narcotic addicts, passed Congress. These hospitals have not yet been built, and it has not yet been published where they will be placed; it is generally believed that one hospital will be in the central mountain region in the southwest, the other one somewhere in the southeast seaboard states. Volunteers or prisoners in state jails may make application for admission to these Federal hospitals.

The problem at present facing the Federal Government is based on the results of the enforcement of the Harrison Law. The legal control of peddling and distribution of narcotics, and the necessity of punishing those found guilty of possession of these drugs, brings the users of narcotics under the ban of the law, and when caught in this statutory crime, they have been sent in large numbers to the Federal penitentiaries. In the three Federal penitentiaries of Leavenworth, Atlanta and MacNeill Island, there are at present confined about 1600 addicts, excessively overcrowding these institutions. The incessant endeavor of the addicts to break

through the prison rules, and obtain their drugs, forces a severity of restriction in the contact of the other prisoners with the outside world, that is exceedingly irksome. This situation has forced the Federal Government to take relief action, and to seek through separation and segregation of the addicts some means to rehabilitate this disturbing group of offenders.

There has not yet been published any details of the method to be employed in the separation of the curable from the incurable, of the criminal from the non-criminal, or any method of reconstruction of their personalities, or the rehabilitation of the individuals. The situation regarding the narcotic addicts in New York State is very similar to that which was presented in the care of the insane before the state took charge of these unfortunates. Unorganized disconnected local care cannot solve the narcotic problem. Practical experience has made it evident that repeated treatments, and withdrawal of the morphine, punishment for its possession, and the legal struggle of law enforcement against the peddlers, is not sufficient to control drug taking by the addicts, and does not rehabilitate, or reconstruct psychopathic personalities. The problem is evidently chiefly a medical and social question, and only on this basis does there seem to be any promise of a successful solution. It is a question more of urban than of rural existence, and the larger the mass of humanity gathered together, the more urgent the situation, and the greater the necessity for its solution.

It seems therefore wiser that the question should be taken up by New York City to control it within its own borders, rather than to wait for the question to be taken up by the state at large.

The Department of Correction has the problem in its hands, and it would seem that the problem could be solved if it is possible to obtain an institution in which the necessary peculiar custodial care could be exerted, and in which the medical problems of psychiatry and modern psychology could be worked out. It is impossible for your committee at this time to give the details for the successful accomplishment of this problem. These require long study, and the most careful consideration.

In general such an institution must be provided with adequate buildings, fairly extensive, in which the different types of psychopathic, and non-psychopathic personalities may be separated, in which the curable and incurable are not hopelessly herded together,

and in which the intense suggestibility of the addict is not constantly brought in play to obstruct any reconstruction and rehabilitation. The criminal will invariably poison the mind of the non-criminal, and the nearly insane will inhibit any reconstruction of his less afflicted companion.

The personnel and staff is more important than the physical buildings of such an institution. Of course those in charge require the special training in psychiatry and psychology necessary for their work, but more than this they require a broad, human point of view that can look with justice and tolerance upon the failings and the anti-social resentment and antagonism of broken down personalities who for months at a time will resent every endeavor to reconstruct them. It requires unceasing tact in their management, and almost unending patience.

The custodial care must of necessity be of a peculiar kind, for the untiring and unceasing endeavor of the addict to obtain his drug when deprived of it, and for long after he has ceased to have his withdrawal symptoms, makes the custodial care peculiarly difficult. Unless the entrance of the narcotic drugs to such an institution can be absolutely controlled, any endeavor for reconstruction will be a failure. Without question from the outside the peddlers and the organized vendors of the illicit supply of drugs will be as untiring to furnish the addict with his drug, as the addict is to obtain it; but all these difficulties are only details of the problem.

Your committee realizes that the problem is one of governmental care of a peculiar group, not insane, but psychopathic, often criminal, but whether criminal or not, they are so regarded by public opinion, and so treated.

The committee would recommend therefore to you as Commissioner of Correction the construction of such an institution, which is here only mapped out in general, but the details of its management must be worked out after further prolonged study.

THE WORK DONE IN THE NARCOTIC WARD AT BELLEVUE HOSPITAL, MAY 28, 1928, TO MAY 16, 1929.

CHARLES SHULTZ, M. D.

On May 28, 1928, one of the wards of the psychopathic department of Bellevue Hospital, with a capacity of 17 beds, was placed at the disposal of the Mayor's Committee on Drug Addiction and opened as a special narcotic ward.

Prison keepers were assigned by the Department of Correction to maintain discipline among the patients and prevent the smuggling of narcotics into the ward by careful inspection of windows which were screened and barred and also of the doors which had special locks fitted on them, the key to which was in their possession.

The medical staff consisted of the physician in charge and an assistant physician. Seven nurses were assigned to the ward and these were divided into three nursing shifts of eight hours each. There was a day and night attendant and one stenographer.

All the patients treated, with very few exceptions of those transferred from the medical or psychopathic wards of Bellevue, were self-confessed drug addicts committed voluntarily to the hospital by a city magistrate, usually Chief Magistrate McAdoo. All were men.

Patients were admitted through the psychopathic admitting office. Their street clothes were removed and searched by a prison keeper for narcotics. The patients were bathed and were given a hospital uniform.

Following this the patient was brought to an anteroom of the narcotic ward, again stripped and again minutely searched for narcotics. A combination enema consisting of saturated solution of magnesium sulphate 4 oz., glycerine 1 oz., green soap, 2 oz., was given to empty the lower bowel and incidentally to remove objects concealed.

The patients were then given a complete physical examination by the physician in charge. Special note was taken to make sure that all were *bona fide* drug addicts, hypodermic marks and other evidences of drug taking being looked for. All the body orifices were examined for possible concealed narcotics.

After the physical examination the patient was admitted to the ward. His height, weight, temperature, pulse and respiration were noted by the nurse and he was given a cathartic. He was then placed on a ration of morphine in the form of Magendie solution given hypodermically every four hours. The amount given was usually 15 minims every four hours, *i. e.*, about three grains of morphine sulphate in 24 hours. This amount was increased or decreased according to the patient's needs and the dosage kept for from one to three or four days until treatment began.

At first the patients were weighed once a week, but later they were weighed daily.

The patients were then interviewed by the physician in charge and all pertinent information relative to their addiction was elicited by questioning, with a view to obtain the statistical information given below and also, if possible, to classify them psychiatrically.

Laboratory work such as urinalyses and blood counts was then done by the assistant physician.

The patients were not allowed to have visitors or to receive packages from friends. No one was permitted to enter the ward unless connected in an official capacity. All food and supplies were handled by the ward employees.

All mail received for patients was opened by the physician in charge in the patient's presence, read by the patient and then destroyed by the physician.

In estimating the value of the statistical and other information obtained from the patients, the known unreliability and untruthfulness of drug addicts must be taken into account.[1]

These patients not only lie about drugs and matters pertaining to their drug habits, but also will not give correct information about name, personal health, occupation, birthplace, nationality, marital condition, family history, criminal records, etc., even unimportant facts.

However, it is reasonable to assume that they will not, in the majority of cases, wilfully give information derogatory to themselves, which is not at least partly true.

Thus admission of criminal records, hereditary taints, "cures" taken, etc., may be accepted as probably true, as the tendency for them is to admit as little as possible and minimize everything of this nature.

The patients were questioned at different times during their stay in the ward and also prior to discharge. In many cases contradictory statements were made but in this way information was obtained which was as near the truth as was possible to arrive in dealing with these individuals.

Statistical Information.

While facts enumerated below are significant in many ways, it must not be forgotten that a similar study undertaken elsewhere with different types of addicts and personalities, would most likely give entirely, or partly different figures.

Number of patients treated, 318. Of these all were white except eight colored patients (16 patients were "repeaters," having been admitted a second time).

Of the patients in different age groups, 1 was between 15-19; 92 were between 20-29; 155 were between 30-39; 57 were between 40-49; 10 were between 50-59; 2 were between 60-69; 1 was between 70-79.

Average age when habit began,[2] 23: oldest, 45; youngest, 12.

Average age at time of admission, 34: oldest, 75; youngest, 19.

Number in different age groups when habit began, 10 were between 12-14; 81 were between 15-19; 117 were between 20-24; 73 were between 25-29; 34 were between 30-39; 3 were between 40-45.

Average of total period of addiction, 11 years. Longest period of addiction in group, 53 years.

Number of patients in different addiction periods, 19 cases were 1 year; 16 cases were 2 years; 13 cases were 3 years; 11 cases were 4 years; 86 cases were between 5-9 years; 145 cases were between 10-19 years; 22 cases were between 20-29 years; 4 cases were between 30-39 years; 1 case was between 40-49 years; 1 case was between 50-55 years.

NOTE.—Here it is significant to note that 59 patients were fairly recently addicted (1-4 years) *i. e.*, 18% have recently begun to use narcotics.

Average duration of last period of addiction before treatment, 2 years approximately.

NATIVITY OF PATIENTS.

United States (New York City or State, 197), 275; Porto Rico, 15; Italy, 8; Cuba, 5; Russia, 5; Argentina, 3; England, Ireland, France, Holland, Spain, Denmark, Venezuela, 1 each.

NATIVITY OF PARENTS.

(This Gives a Better Index of Patients' Origins.)

United States, 108; Italy, 52; Ireland, 43; Russia, 35; Porto Rico, 15; Germany, 14; Austria, 12; Spain, 5; England, 4; Scotland, 4; France, 4; Canada, 3; Roumania, 3; Poland, 3; Sweden, 2; Argentine, 2; Holland, 2; Mexico, 1; Norway, 1; Switzerland, 1; Cuba, 1; Denmark, 1; Africa, 1; Venezulea, 1.

RELIGION OF PATIENTS.

Catholic, 193; Protestant, 63; Hebrew, 62.

EDUCATION.

Public school, 230; high school, 64; college, 18; self-educated, 3; illiterate, 3.

MARITAL STATE.

Single, 198; married, 90; widowed, 15; divorced, 3; separated, 12.

OCCUPATION.

(As Given by the Patients.)

NOTE.—Addicts may be divided into two groups, the criminal and non-criminal.[3]

Of the former many are drifters who never work except when out of money for drugs. These tend to go to excess in the amount of drug used and this is one reason why they cannot do steady work.[4]

As a result, some work at different times at irregular odd jobs such as loading and unloading in markets or alongshore; engage in street peddling, etc.

Others won't work and prefer to gamble, steal or beg. Some of these types openly admit that if they can get enough money by begging, stealing or other shady practices, they don't think it worth while to work, in fact think it is a disgrace to work, and feel hurt if work is suggested to them regarding it as an insult to their intelligence.

Incidentally, a large percentage of addicts think they are justified in stealing to avoid suffering when short of drugs.

However, some of these patients work steadily, earn good wages and support their families and to all intents and purposes are useful members of society. These are usually moderate in amount of drug used and only take sufficient to "keep them normal," at regular intervals. This type is found usually among the non-criminal addicts.

Given Occupations of 318 Addicts.

Laborer, 62; salesman, 31; clerk, 27; waiter, 18; painter, 16; seaman, 12; plumber, 11; chauffeur, 11; driver, 9; machinist, 7; mechanic, 7; gambler, 5; cook, 5; tailor, 5; peddler, 5; barber, 4; printer, 4; porter, 4; physician, 3; electrician, 3; janitor, 3; usher, 3; bus boy, 3; roofer, 3; junkdealer, 3; none, 2; milliner, 2; butcher, 2; tinsmith, 2; steamfitter, 2; musician, 2; attendant, 2; orderly, 2; teamster, 2; stevedore, 2; autochecker, 1; motorman, 1; teacher, 1; steeplejack, 1; plasterer, 1; aviator, 1; nurse, 1; doorman, 1; boxing promoter, 1; shoe cutter, 1; checker, 1; toolmaker, 1; wireless operator, 1; carpenter, 1; bricklayer, 1; pipe fitter, 1; umbrella maker, 1; sign maker, 1; welder, 1; actor, 1; reporter, 1; paper hanger, 1; fireman, 1; cashier, 1; broker, 1; paver, 1; advertizer, 1; stone cutter, 1; speculator, 1; engineer, 1; publisher, 1; storekeeper, 1; boiler maker, 1; dancing instructor, 1.

Thus it appears that there are addicts in many walks of life. However, from the impoverished financial condition and dishevelled appearance on admission most of our patients had not worked at their given occupations for some time at least.

Reasons Given by Patients as Cause of Addiction.

Association with other addicts[5] (environment), 256; illness, 23; doctors' treatment,[6] 18; alcoholism,[7] 14; imprisonment, 3; access to drug (father a physician), 2; prohibition (could not get a drink), 1; loss of parent, 1.

Summary.—Thus we find that environment is the most important etiological factor.[8, 9, 10] The reasons given by patients for first using drugs are often a self-justification or rationalization, and when they claim illness it is often a retrospective falsification.

Besides association, illness, etc., which are given as causes an interesting point comes to light. Many of them began using heroin through *sheer ignorance* when it first came out, as it was said not to be habit-forming and was passed about in poolrooms, dance halls, street corners, etc., where psychopaths usually mingle.

Initial contact with the drug may be accidental, but repetition and continuation, *i. e.*, self-indulgence, is not accidental.

A drug user does not expect at first to become addicted, but addiction is impressed on the individual as soon as abstinence symptoms are severe enough to frighten him. He then awakens to the fatal knowledge that he

is "hooked," which information other addicts are only too glad to give him. When more of the drug is taken and the symptoms are relieved, this idea of the necessity of continuing its use is impressed indelibly on his mind and accepted without very much resistance as there is, besides the pains of withdrawal, considerable pleasure and relief also.

Another potent factor in the etiology of drug addiction is that of too much spare time at the disposal of idlers and drifters, many of them psychopaths. Naturally they look for amusement, and so are willing to gamble, or take a chance, try drugs, etc., "anything once."

Although only one patient was listed as an actor, quite a few had been connected with the stage or stage people and these claimed to have begun the use of opium by smoking purely as a dissipation, later turning to morphine or heroin by hypodermic injection.

Amount of addiction attributable to physicians' treatment appears to be negligible in type of cases studied.

Hereditary Factors.

At this point it may be interesting to note hereditary predisposition if any. We obtained the following information:

Father, alcoholic, 32 cases; father died of alcoholism, 4 cases; brother died of alcoholism, 1 case; brother a drug addict, 11 cases; two brothers addicted (besides patient), 1 case; cousin addicted, 1 case; wife* addicted, 1 case; mother died insane, 2 cases; father died insane, 1 case; sister died insane, 2 cases; brother died insane, 1 case; brother died from "neurasthenia," 2 cases; sister had "nervous breakdown," 2 cases; brother had "nervous breakdown," 1 case; mother had hysteria, 1 case; brother epileptic, 1 case; parents "nervous," 1 case; family "nervous," 1 case; mother "nervous," 1 case.

Summary.—Thus we have elicited evidence of psychopathy in the immediate family in 60 cases. The true number, most likely is greater.

Drugs First Used.[11]

Heroin, 153 cases: 134 by sniffling and 19 by hypodermic. Opium (by smoking),[12] 69 cases. Morphine, 58 cases: 47 by hypodermic and 11 by mouth.[12a] Cocaine (by sniffling), 33 cases. Maruahuana (hashish) (by smoking), 2 cases. Laudanum (by mouth), 2 cases. Morphine and atropine (by mouth), 1 case.

Drugs Used at Different Times.

Heroin, 295 cases; morphine, 195 cases; cocaine, 130 cases; opium, 99 cases; alcohol (to excess), 40 cases; maruahuana (hashish), 19 cases; paregoric, 8 cases; laudanum, 6 cases; atropine, 5 cases; codeine, 4 cases; luminol, 3 cases; bromides, 3 cases; veronal, 2 cases; chloral, 2 cases; trional, 2 cases; dionine, 1 case; pantopon, 1 case; allonal, 1 case; amyl nitrite pearls, 1 case; hyoscine, 1 case.

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*Addicts often produce addiction in their wives, and the true number of these cases is probably greater.

Drugs Used at Time of Admission.

Heroin, 263 cases (82%): 251 by hypodermic; 11 by intravenous injection;[13] 2 by sniffling; and 1 by mouth. Morphine, 31 cases: 49 by hypodermic; 2 by mouth. Opium, 6 cases: 4 by smoking; 2 by mouth. Paregoric (by mouth), 1 case. Heroin and cocaine, 3 cases. Heroin and alcohol, 1 case. Heroin and morphine, 1 case. Heroin and paregoric, 1 case. Heroin and veronal, 1 case. Morphine and alcohol, 1 case. Morphine and atropine, 1 case. Morphine and cocaine, 1 case.

Average Daily Dosage at Time of Admission.

(According to Patients' Statement.)

Heroin addicts, 21 grains (approximately); morphine addicts, 12 grains (approximately).

Note.—The amount of drugs the patients actually use is uncertain. The patients themselves admit that they do not know exactly. Their only method of estimation is to say an ounce lasts them a certain length of time.

They also admit and realize that drugs as sold to them are adulterated, and so the exact quantity they use is really unknown in the majority of cases.

It is a well known fact that heroin addicts tend to use the drug to excess and this may account for the number of "vein shooters" who take injections directly into the vein, among them.

Morphinists are usually more moderate in their dosage and less unstable.

Previous "Cures" Taken.

Note.—By "cures" is meant any so-called "specific" treatment or other method whereby patients' habit was broken.

Number of patients admitting previous "cures," 279 (88%); average number of treatments per patient, 4 (approximately); number of patients denying previous "cures," 39.

Proportion of Previous "Cures" Among Patients.

Thirty-eight patients admitted 1 treatment; 67, 2 treatments; 54, 3 treatments; 43, 4 treatments; 32, 5 treatments; 10, 6 treatments; 9, 7 treatments; 9, 8 treatments; 3, 9 treatments; 4, 10 treatments; 5, 11 treatments; 3, 12 treatments; 1, 20 treatments; 1, 30 treatments.

Types of "Cures" Taken.

Reduction treatment,[14] 217 cases (68%): Once, 93 cases; twice, 65 cases; three times, 22 cases; four times, 23 cases; five times, 6 cases; six times, 3 cases; eight times, 3 cases; nine times, 1 case.

Abrupt withdrawal "cold turkey,"[15] 140 cases (45%): Once, 96 cases; twice, 32 cases; three times, 7 cases; four times, 3 cases; 11 times, 1 case; 24 times, 1 case.

Hyoscine treatment,[16] 107 cases (34%): Once, 84 cases; twice, 17 cases; three times, 4 cases; four times, 3 cases.

Narcosan treatment,[17] 92 cases (30%): Once, 79 cases; twice, 13 cases.

Belladonna treatment,[18] 37 cases (12%): Once, 35 cases; twice, 2 cases.

Stoke's treatment,[19] 4 cases.

Sceleth treatment,[20, 21] 4 cases: Once, 2 cases; twice, 2 cases.

Keely "Cure," 3 cases; Once, 1 case; twice, 2 cases.

Malaria treatment (?) 1 case.

Spinal injection (?) 1 case.

Unclassified treatments, 16 cases: Once, 5 cases; twice, 4 cases; three times, 3 cases; four times, 1 case; five times, 1 case; eight times 2 cases.

Periods of Abstinence.

No period of abstinence since habit began, 103 cases (32%).

Note.—Those patients who admitted "receiving cures" were questioned as to the longest time they ever abstained from drugs after any of these treatments.

The following information was elicited:

Longest period of abstinence of 1 month, 9 cases; 2 months, 16 cases; 3 months, 11 cases; 4 months, 6 cases; 5 months, 5 cases; 6 months to 11 months, 36 cases; 1 year to 1 year 11 months, 57 cases; 2 years to 2 years 11 months, 29 cases; 3 years to 3 years 11 months, 20 cases; 4 years to 4 years 11 months, 12 cases; 5 years to 9 years, 13 cases; 12 years 1 case.

It is interesting to note that these periods are estimated in *months* in most cases.

Average longest period of abstinence for above group 15.6 months.

Summary.—The above information shows that 88% of the cases studied are recidivists who have received nearly all the so-called "specific treatments," at one time or another before admission without success apparently. (These figures agree with the observations of Mr. John I. Cotter, of the Court of Special Sessions of the City of New York who has gathered statistics of criminal drug addicts.)

In other words, the term "cure" is entirely erroneous as these self-styled "specifics" do not cure.

All they do is to interrupt, with more or less suffering, the drug addiction habit, which is sooner or later resumed.

The actual number of previous treatments taken is probably greater than the figures elicited.

The number of drug addicts who permanently abstain from narcotics has been estimated by various authorities on the subject to range from 2 to not more than 10%.

Reasons Given for Relapses.[22]

The patients give a great variety of reasons for reverting to drugs after a so-called "cure"—"feelings of weakness," "aches and pains," "mental depression," "meeting addicts again," "troubles," "worries," etc.

The reasons given for relapses are often not the real ones, but only self-justification (*i. e.,* if any reason at all is given in all seriousness). Very often they are irrelevant, or the patients say that they "don't know," or just call it folly, or give similar reasons as for original onset of habit.

Frequently they admit they go back because they want to, because they like the "kick" they get out of drugs; in fact, in many cases, the patients do not think addiction is a vice, or that it injures them. On the contrary, to them it is a pleasure, and they call the drug "God's Medicine," because it relieves all their aches and pains, in fact, they believe it does them good and wards off illness. In consequence, they are amused at the attempts of the authorities to reform them.

Incidentally, at every cure they increase their knowledge of drugs, and the number of drug addict acquaintances, whom they meet later to be tempted again. In other words, many "cures" make the environmental difficulties of the addict so much worse afterwards.

Another important fact is that the majority leave the institutions penniless—some have to steal (according to their way of explaining it) to get money. Then they meet the drug vendors who gladly offer them some of the drug—a "pickup," "free of charge," "as a favor"—well knowing that in this way they will again become addicted, and so later again be "paying customers."

It appears once addicted, very slight difficulties or pretexts are sufficient reason for relapse; and they are physically more susceptible to re-addiction.

Even patients who admit prolonged after-care in previous "cures," or prolonged punitive detention in penal institutions relapse.

Criminal Records of Cases Studied.[23]

Note.—This was a rather delicate subject to approach and true information was difficult to obtain. Most likely the actual figures are greater than those following:

Number of patients admitting criminal records, 265 (83.3%). (Of these 120 cases or 45.3% were arrested for possession of narcotics only. 145 cases or 54.7% were arrested for drug offenses and other crimes.)

NATURE OF ALL OFFENSES ADMITTED.

Possession of narcotics, 216 cases: Disorderly conduct, 36 cases; petty larceny, 35 cases; grand larceny, 28 cases; burglary, 24 cases; intoxication, 18 cases; drug selling, 17 cases; assault, 16 cases; gambling, 14 cases; vagrancy, 8 cases; concealed weapons, 7 cases; homicide, 5 cases; robbery, 4 cases; suspicion, 3 cases; peddling, 2 cases; manslaughter, 1 case; counterfeit money charge, 1 case; safe breaking, 1 case; pickpocketing, 1 case;

robbing mails, 1 case; rum running, 1 case; unlawful entry, 1 case; race-track "touting," 1 case; misdemeanor, 1 case.

While the majority of drug addicts do not use alcohol, and, in fact, show considerable contempt for "rummies" as they call them, there are some cases where the individuals take to drugs to get off alcohol and *vice versa*. When off his narcotic drug addicts are not adverse to alcohol.

Reasons Addicts Apply for Treatment.

On admission the reasons given for taking treatment are numerous and varied. The patients say they wish to be "cured" for their own and their families' sakes"; that they want to improve their health; that they are disgusted with their habits and only use the drug to "keep normal"; that they regret losing all their friends, etc.

These are often not the true reasons. The actual facts sometimes come out during their stay in the ward.

Some of the patients openly declare that the only reason they sought admission was to have their daily dosage cut down (their expression is "to be let down as easily as possible," or, "to get their habits reduced"), so that on discharge they can get the same "kick" or exhilaration as beginning addicts ("virgin drug addicts") out of smaller amount of drug.[24]

Many admit they apply for treatment impulsively in a period of depression or despondency, when an addict may decide to "take a cure" and, throw all his drugs away or give it to the physician on admission and then just as suddenly repent and try to bribe the employees to obtain his narcotics back again, or be discharged.

Other real reasons are, lack of money to buy the drug (thus seeking admission to get free board and lodging and possibly a morphine treatment); loss of "connection" as the drug vendors or distributors are called; because they get no more "thrill" from the "drug," or because the narcotic detectives threaten to arrest them, unless they "take a cure."

Summary.—Number of patients treated, 318.

The majority of the patients, 155, or 50% approximately, were between the ages of 30-39.

The average age of all the patients was 34. The average age when the habit began was 23. The average age total addiction period was 11 years. The average duration of last period of addiction at time of admission was 2 years approximately.

Thirty-nine patients, or 18%, had recently begun to use narcotics (1 to 4 years).

Majority of the patients 275, or 87%, were American-born, of whom 197, or 62%, were born in New York City or State.

Two hundred and thirty of the patients, or 72%, had public school education. Only three were illiterate.

The majority of the patients were single, 198, or 62%.

Two hundred and fifty-six patients, or 80% approximately, gave "association with addicts" or environment as the cause of addiction.

Heroin was the chief drug used. 263 of the patients, or 82%, used it at the time of admission with an average daily dosage of 21 grains approximately.

Eighty-eight per cent of the patients (279) admitted "previous cures."

Two hundred and sixty-five, or 83.3%, admitted criminal records.

Physical Condition of Patients.

The patients were carefully examined on admission by the physician in charge, with the following findings:

First, the patients were classified in a general way as being in good, fair, or poor condition.

By *good* is meant well developed, fairly well nourished, with no gross organic disease.

By *fair* is meant poorly nourished, but without gross organic disease, or only slight defects.

By *poor* is meant poorly nourished, or cachectic, diseased or organically deteriorated, and potential danger risks for a drug withdrawal treatment.

Number of patients classed as *good*, 140 (44%); *fair*, 133 (42%); *poor*, 45 (14%).

The majority of the patients were below their normal weights, some were much emaciated, but there were a few who were actually obese.

Types Not Suited for Treatment.

There are a certain number of drug addicts who are suffering from serious, chronic incurable and painful ailments or those who have reached advanced age with consequent physical deterioration, or, who are suffering from an acute medical or surgical condition which may necessitate the continued use of narcotic drugs in the interest of the patient's life, comfort, and best treatment.

Two committed patients were rejected as not suitable for a drug withdrawal as they were suffering from serious diseases requiring continued morphine dosage. One of them had a carcinoma of the neck, with lung metastases, for which he was admitted to a surgical ward; the other had acute edema of the larynx, with paralysis of the vocal cords, requiring immediate tracheotomy with intubation, which was done by the nose and throat department.

Another drug addict who was a patient in the prison ward was found to be suffering from peri-urethal abscess for which he was operated upon in the genito-urinary department where he died.

Our only death in the ward was that of a patient who was 65 years of age, in poor physical condition, suffering from chronic cardio-vascular-renal disease, whose habit was of 36 years' duration. This patient died on the third day of a reduction treatment when his morphine dosage had been only moderately reduced.

We mention this case at this point for the purpose of illustrating the preceding section.

Body Structure Type.

Besides the detailed physical examination an attempt was made to group the patients according to Kretchmer's classification into the different body types (Kretchmer—Physique and Character).

It is a well-known fact that in many cases, there appears to be a definite relationship between physical and mental characteristics.

In general, there are three large groups of physical types, the asthenic, the athletic, and the pyknic.

The *asthenic* type includes the angular, long-nosed, weak-jawed, narrow-chested, delicately-built type of people, the kind Shakspeare described when he wrote:

> "Yon Cassius has a lean and hungry look,
> He thinks too much, such men are dangerous."

The *athletics* are the powerfully-muscled, raw-boned, broad-shouldered, long-limbed people.

The *pyknic* types run to obesity. They are usually short, squat, large-headed, heavily-jowled, florid-complexioned, thick-necked, with narrow shoulders, soft muscles, paunchy abdomen, broad thick hands, and a tendency to early baldness." Shakspeare's "Sleek-headed men and such as sleep o'nights."

Among the asthenics were included the dysglandular and dysplastic types, *i. e.*, those with apparent glandular dyscrasias or the poorly developed immature types.

According to this classification the patients fell into the following groups: Asthenic, 167 (52.5%); pyknic, 84 (26.5%); athletic, 67 (21%).

Thus we see that slightly more than half the patients were of the poorer type of body build, with the possible inference that they were not physically constituted to resist the stresses and temptations of life as well as others.

Detailed Physical Findings.[35]

In general, the majority were poorly nourished (as their appetite is usually poor while using narcotics), many were cachetic in appearance, with pale, sallow, or muddy complexions. Others appeared quite normal physically. Many appeared older than the stated age.

On admission, they were usually under the influence of a heavy dose of their narcotic drugs, mental and physical reactions being sluggish. Some, however, were admitted suffering from early withdrawal symptoms.

Their entire appearance indicated neglect and lack of hygiene in the majority of cases. Their clothes were shabby (many were admitted in mid-winter, without overcoat or underwear), their bodies dirty; hair long, uncombed, some verminous.

Eyes.—While under the influence of narcotics the pupils were small and reacted to light sluggishly, otherwise they were normal in the majority of cases.

Examination of the fundi, with the left pupil dilated with a few drops of 2% homatropine solution elicited very little that was distinctive or pathological—in fact, the majority were surprisingly and regularly normal. Some cases showed an apparent vascular change—eight patients had a slight pallor of the disc, eighteen cases showed what appeared to be a moderate congestion of the eye-grounds; five cases were listed as pseudoneuritis, eight as "blurring of edge of disc," four patients showed cataract, four arteriosclerosis, two, an old choroiditis, and one, medullated nerve fibres.

Ears.—Nothing significant was noticed; a few cases had chronic otitis media.

Nose.—Some of the patients who had sniffed heroin or cocaine for a long period showed perforation of the nasal septum; others showed a congestive condition of the nasal mucosa with resultant obstruction and consequent nasal speech.

Mouth.—As a result of their general indifference to personal hygiene, and also possibly as a result of the deadening of nervous sensibility incident to the use of narcotic drugs, the majority of the patients showed neglected, discolored, and carious teeth, and in some cases the dental caries had advanced to a degree where only a few blackened roots were left. A few of the patients had fairly well kept and well preserved teeth.

Palate.—On admission quite a few of the patients showed considerable blanching, or anemia of the hard palate.

Throat.—Most of the patients showed a slight congestion of the pharynx, for which excessive cigarette smoking may have been partially responsible.

Glandular System.—Many patients showed enlarged and palpable lymphatic glands, *e. g.*, epitrochlear and inguinals which may have been a consequence of the numerous injections into the arms and legs.

Some of the patients showed evidence of glandular dyscrasias such as obesity—two cases; eunuchoidism, feminism, and -status lymphaticus.[26]

Chest.—Lungs: Many of the patients have some pulmonary congestion or bronchial irritation as a result of excessive cigarette smoking. Others show occasional râles as a consequence of increased bronchial secretion, which is sometimes present when the patient begins to have abstinence symptoms.

However, quite a few had definite pulmonary pathology which was confirmed by X-ray examinations. Following is a list of pulmonary diseases found in the patients examined.

Pulmonary tuberculosis (active or quiescent), 18 cases; chronic bronchitis, 18 cases; emphysema, 5 cases; bronchial asthma, 5 cases; resolving pleuropneumonia, 2 cases; bronchiectasis, 1 case.

Cardio-Vascular System.[27]—The heart sounds were often distant, and of poor quality, although no valvular lesions were observed. The aortic second sound in many cases was not as clearly defined as in normal hearts. Occasional patients showed arrhythmia on admission, usually due to extrasystoles. One patient had a bradycardia. Five patients were diagnosed as "chronic myocarditis." One patient who died during treatment suffered from chronic cardio-vascular renal disease. One patient had angina pectoris.

Blood Pressure—in general was usually at the lower limits of the normal figures, agreeing with the findings of Drs. Light and Torrance in Philadelphia. However, a small number of patients had hypertension.

Average Blood Pressure (200 patients).—On admission, 118/79; highest, 170/86; lowest, 84/50. During stay, 120/75; highest, 115/95; lowest, 98/57, On discharge, 119/75; highest, 151/82; lowest 92/54.

Dr. O'Connor, visiting physician to the N. Y. Penitentiary, informed the writer that when drug addicts required anesthesia it was advisable to have an air suction or aspiration apparatus available as they are very apt to fill up with mucus, especially during ether anesthesia, owing to this cigarette-irritated bronchitis present, because they are all terrific smokers.

Following are figures of blood counts which were done by the assistant physicians.

Average Blood Counts (250 cases).[28]—Erythroctyes, 4,527,170: Highest, 5,560,000; lowest, 3,200,000. Leucocytes, 8087: Highest, 14,000; lowest, 5400. Hæmoglobin, 77.6%: Highest 100%; lowest, 58%.

The following is an average of two hundred differential blood counts:

Polymorphonuclears, 71.5%: Highest, 91%; lowest, 48%. Large lymphocytes, 11.0%: Highest, 26%; lowest, 3%. Small lymphocytes, 17.5%: Highest, 18%; lowest, 4%. Transitionals, 3.8%: Highest, 15%; lowest, 0%. Eosinophiles, 0.72%: Highest, 3%, lowest, 0%.

Blood Chemistry.[29]—A certain number of blood analyses for non-protein nitrogen and blood sugar were done in the pathological department of Bellevue Hospital.

The following are the non-protein figures for 143 patients: 25 to 30 mg. per 100 c. c. of blood, 17 cases, or 11.9%; 31 to 40, 97 cases, or 67.8%; 41 to 50, 20 cases, or 13.9%; 51 to 60, 6 cases, or 4.2%; 61 to 70, 2 cases, or 1.4%.

The following are the results obtained in the blood sugar investigation of 138 patients: 60 to 70 mg. per 100 c. c. of blood, 1 case, or 0.71%; 71 to 80, 61 cases, or 44.3%; 81 to 90, 42 cases, or 30.8%; 91 to 100, 18 cases, or 13.0%; 101 to 110, 4 cases, or 2.9%; 111 to 120, 6 cases, or 4.3%; 121 to 130, 4 cases, or 2.9%; 154, 1 case, or 0.72%; 211, 1 case, or 0.72%.

Dr. S. R. Benedict made a special determination of the total Lipin, cholesterol, total fatty acids, phospholipin and lactic acid content of the blood of morphine and heroin addicts during addiction and after withdrawal. Inorganic phosphorus and total solids have been determined during addiction.

The Narcosan treatment for chronic drug addiction has been compounded on the theory that morphine alters the condition of the vitally important cell lipoids. The cholesterol figures recently published by Light, Karr and Torrance, however, are the only lipoid values reported on the blood of chronic addicts.

For the work on total lipin, fatty acids, and cholesterol, 10 morphine and 13 heroin addicts in good nutritional state were selected. These were maintained for three days after admission to the ward on three to four grains daily of morphine sulphate. This amount was found sufficient to prevent withdrawal symptoms, and to maintain the patients in a comfortable condition, and was the amount used in all the cases studied. Blood was drawn on the first and

third day after admission, and in seven cases, before discharge. Due to the uncooperative character of the addicts, and the regimen of the ward in which light lunches were served at frequent intervals, it was impossible to depend on getting fasting blood. Blood was, therefore, drawn at a regular period in the morning, four to five hours after a light breakfast, and within one hour after coffee and bread. It has been shown that the rise in blood cholesterol following a meal returns to normal four hours later, and that bread and butter with tea or coffee produces no marked change in cholesterol content. The phospholipins in the blood of man do not appear to be affected by ingestion of food. An increase of varying extent, however, in the blood fatty acids and total fat from one to six hours following a meal has been observed by several workers.

Controls were therefore run using mild psychopathic patients of similar nutritional state maintained on the same regimen in the hospital, and from whom blood was drawn at the same time. Blood was also obtained from seven addicts before discharge, two weeks after admission to the ward, and 10 days after the withdrawal of morphine. These values were compared with those obtained from the same patients on admission.

Blood for phospholipin and lactic acid determinations was taken on the same patient on admission to the hospital and before discharge following various withdrawal and reduction treatments of from 10 to 14 days duration. This blood taken before discharge was taken from four to 10 days after the withdrawal of morphine. Six of the bloods used for lactic acid determinations were drawn without stasis. No difference was observed between the values obtained with and without stasis.

The results found indicate that the figures obtained for plasma total lipins, total fatty acids, cholesterol phospholipins, and phosphorus on drug addicts during addiction have been found to be within the normal range. The lactic acid and total solid values in whole blood have also been normal.

And further, no alteration was observed in the values of total lipin, total fatty acids, cholesterol, phospholipins, and lactic acid obtained from addicts, following short periods of treatment.

Dr. Isaac Neuwirth, working at New York University under the supervision of Dr. George B. Wallace, obtained figures of the calcium and magnesium content of blood serum before and during magnesium sulphate therapy.

The figures will be found on page 522.

The pulse was frequently of the low tension, easily compressible type, often slow, sometimes intermittent.

Addicts who took injections intravenously ("vein-shooters" or "main-line shooters") (11 cases) showed thickened, and discolored, and sometimes thrombosed median cephalic and basilic veins.

Venereal Disorders.—Thirty-one patients, or 10% approximately, gave a history of having had chancre, or chancroid.

One patient on admission was found to be suffering from primary and secondary lues. Another patient had secondary lues on admission.

The following Wassermann reports were obtained from the Bellevue Pathological Department: Negative, 262 cases; 4 plus, 8 cases; 3 plus, 3 cases;

2 plus, 2 cases; 1 plus, 2 cases; doubtful, 6 cases; anti-complementary, 2 cases. No report was received on 33 patients.

The large proportion of negative reactions is surprising. We have no explanation to offer at present.

Gastro-Intestinal System.—The gastro-intestinal system showed the usual effects of the use of narcotics, anorexia, tongue often coated, symptoms suggestive of chronic gastritis, constipation, many had hemorrhoids. One patient showed a chronic cholecystitis, one patient was shown by roentgenogram to have a duodenal ulcer, two patients had ischio-rectal abscess. Two patients had large ventral hernias, one as a result of a splenectomy, the other as a result of a nephrectomy. Two patients had post-operative abdominal adhesions and several patients had inguinal hernias.

Genito-Urinary System.—One hundred and twenty-five patients, or approximately 40%, gave a history of previous gonorrheal infection; two patients had acute urethritis, two had chronic urethritis on admission; two patients had had a previous nephrectomy, one of whom also showed signs and symptoms of chronic pyelonephritis on admission.

On admission the urinalysis of 250 patients showed the following: Albumen: Trace, 24 cases, or 9.6%; moderate, 1 case; marked, 1 case. Sugar, 1 case, or 0.4%. Acetone (faint trace), 5 cases, or 2.0%. White blood cells, 51 cases, or 20.4%. Red blood cells, 2 cases, or 0.8%. Casts: Hyaline, 1 case, or 1.6%; granular, 1 case; hyaline and granular, 2 cases.

Nervous System.—The findings in general were negative, many of the patients had increased tendon reflexes. One patient showed a typical Parkinsonian post encephalitic syndrome.

Locomotor and Tegumentary System.—The majority of the patients showed marks and scars, often disfiguring, of hypodermic injections, and infections; the longer the habit, the more marked the scarring as a rule.

Some of the patients showed hypodermic marks on every area of their bodies accessible to them, others had marks in areas where the patient himself could not reach, and which were the result of injections by other addicts.

The skin markings were of different kinds, recent ones were small, raised, red elevations: older marks consisted of discolored scars or bluish or brown macules.

Another type of marking was called by the patients "nickel, dimes, and quarters" scars. These were round, punched-out, depressed scars of varying sizes in the skin which the patients said were not due to abscesses, but were the result of "hot shots," or drugs adulterated with "acid" or of injections of ether.

Some of the more careful types of addicts showed very few or no hypodermic marks, or only a few scattered needle marks.

More than two-thirds of the patients were tattooed in one or more areas.

Very few showed acute infections or abscesses. Three patients had cellulitis which consisted of extensive confluent and anastomosing net-work of abscesses, with many sinuses perforating the skin and exuding pus.

Many patients, as the result of injections, showed considerable thickening of the skin of the arms, legs and abdominal wall; and in some cases the

abdominal wall was thickened to the extent that it felt almost rigid and board-like.

Patients who injected their drug into the muscles of the arm and shoulder often showed chronic changes in these muscles resembling myositis and resulting in thickening and some contracture. One of the patients had considerable limitation of the movement of the muscles of both shoulders and chest wall as the result of intramuscular injections.

Another patient was so emaciated that he injected the drug into the tissues about, and directly into both elbow joints, with the result that a right-angled anklyosis of both elbow joints, was present.

The majority showed poor muscular development, and increased irritability was often observed especially of the pectoral group of muscles which would respond to percussion by spasmodic contractions.

In addition several of the patients showed the scratch marks of pediculosis, "vagabond's disease." Three cases showed chronic osteomyelitis, one patient had chronic arthritis, two patients had psoriasis.

Naturally patients who took the drug by sniffing or smoking only, did not show any skin markings.

Summary.—More than half of the patients treated were of the poorer physical types. Physical changes in these cases as a result of the use of narcotics were incidental to the lack of personal hygiene and malnutrition rather than secondary to the effects of opium *per se*. Demonstrable results of the use of narcotics are mainly the result of the means employed by the addict in taking the drug, and these were mostly skin manifestations.

In general the chemical analyses of blood, urine, etc., of drug addicts gave results which vary but slightly from the average normals.

Psychiatrical Classification.

The prognosis in the treatment of drug addiction depends in great part on the integrity of the patient's personality. Those patients who are suffering from neurotic or psychopathic taints, or disorders, give very poor hopes for rehabilitation, as no drug treatment can change a fundamental personality defect.

For this reason a knowledge of the mental status of the drug addict is a matter of great importance.

One of the lines of investigation was an attempt to group the patients into fundamental reaction types as "schizoids," "syntonoids," and mixed types. Another was to determine if any real evidence of psychopathic, or inferior personality existed and whether this defect could be said to be pre-existent or inherent or incidental to the use of drugs.

By psychopathic we mean specifically psychically abnormal, in ways other than those of mental deficiency, epilepsy, the psychoses, psychoneuroses, or alcohol and drug addiction.

An effort was also made to elicit any evidence of psychic deterioration said by many authors to follow the prolonged use of narcotics.[20, 21]

It is easy to read psychopathy into any group of individuals examined, as nearly everybody has certain traits which are peculiar and differentiate one person from another. It is even easier to brand all drug addicts as psychopaths,[32] and the natural tendency is to do so.

However, we tried to avoid this line of least resistance, and only considered as psychopathic any marked variations and unusual distortion of the personality and make-up; which were abnormal to such a degree as to hinder the individual's proper adjustment.

The methods used to obtain the necessary information and data upon which the findings were based were varied.

The patients were questioned about their school records; adjustment of their work, social and marital life, criminal records, etc.

Intelligence of the patients was judged in a general way by their answers and conduct, as the peculiar lack of cooperation of many of these individuals renders them as a class unsuited to routine psychometric tests.

Note was taken of the patient's attitude, apparent sincerity, honesty and truthfulness, psychomotor responses; coherence of ideas; tendencies to introversion or extroversion; emotional reactions in general and to questions asked; and their productions noted as being spontaneous, prolific, or reticent and evasive. Their general conduct and behavior on the ward, seclusive or social personality, suspiciousness, willingness to help on the ward, and the reactions to patients, nurses, doctors, etc., all give some clues as to their make-up.

In addition, situations were deliberately created to see their responses to different stimuli, *e. g.*, emotional reaction to kindly and indulgent treatment by yielding to requests for extra food, luxuries, and treatment ("pick-ups"); or the response to a firm, strict attitude, with refusal of all favors.

In this way, as much as possible of their innate psychological make-up was elicited, considering the relatively short period of observation that was available.

The information obtained and general impression gained of their mental make-up was used to classify them into the appropriate reaction and personality types.

Fundamental Reaction Types.[33]—Bleuler's classification of mental reaction types as syntonoid, schizoid, and mixed types was chosen as comprehensive.

The syntonoid conveys the idea of a type of personality well integrated as a harmonious whole, well functioning. In the syntonoid types there is a contact with reality. The affects are vivid, suitable to the situation. Their thinking follows logical laws. They are emotionally active and responsive types of persons, well adjusted. If the mood in the type remains uniform then the representative of this type passes as a normal person.

In the schizoid types the contact with reality is not so firm. There is a lack of uniformity in the affective reaction, and incongruity with indications of contrasting strivings in individuals with slight deviation from usual paths. When the schizoid types are pronounced they are seclusive, irritable and may be paranoid. The schizoid types are more abnormal than the syntonoid.

The schizoid is as much of a biological reaction type as the syntonoid. Systems of philosophy, inventions, revolutions, and religious movements are due to the schizoid types.

Every person, whether sick or well, probably possesses both schizoid and syntonoid components in his make-up.

According to this grouping, the patients were classified as follows: Schizoid, 132 patients (41.5%); syntonoid, 97 patients (30.5%); mixed types, 89 patients (28%).

Thus we see that the majority belong to the more abnormal schizoid group.

Intelligence.—In general they were found to be of average intelligence. The majority had received a fair education, most of them at public school, some of them high school, and a few college. A few of the patients treated were superior types intellectually.

However, fourteen patients (less than 5%) appeared to be inferior mentally, probably high-grade morons, and even these gave the impression of having their dull wits sharpened by the use of drugs.

As a group the suggestibility of these patients was very noticeable, and affected their behavior when treated.

Personality Types.[34]—Judging the patients by the data obtained, we have classified them as follows:

Unclassified, 42 patients (13.2%); *i. e.,* in 13.2% of the patients treated little or no evidence could be elicited of psychopathic personality other than the drug addiction *per se.* These cases gave the impression of having possessed and still retaining normal personalities.

Inadequate personality, 96 patients (30%). While the majority in this group were probably psychopathic types who had been the shiftless black sheep, and ne'er-do-wells of their families before using drugs and whose failings may have been accentuated as a result of the addiction, there were some who appeared to have been fairly normal individuals before using drugs, but who went to seed afterwards, from what information was available.

Emotional instability, 65 patients (20%). Here there is a question, in some cases, as to whether the instability was present before or came as the result of the addiction. Undoubtedly, the majority were unstable before using drugs.

It is rather interesting to observe the marked change in these unstable psychopaths when they are taken off the drug. Their emotional tone shows such wide and rapid swings, and their mood is so changeable that one is tempted to say that some of these types are more normal, or less psychopathic, on the drug than off.

There are some types who from their previous histories appeared to have been more stable before using narcotics, and in whom the instability was secondary to the use of drugs. (In all the observations carried out on these drug addicts, the emotional instability was the most striking feature.)

Besides the emotional instability there appeared to be an equivalent physical instability, which was evidenced by the rapid variations in body weight

and at times in the blood pressure and vasomotor tone of the patients, during and after treatment.

The above three groups may have included a certain percentage of normals among them. The following groups appear to have been basically psychopathic.

Criminalism, 41 patients (13%). The dominant feature here is seen to be profound egoism combined with complete indifference in regard to ethical issues. The exclusive aim of such an individual is his own pleasure or his own interest. He has neither sentiment of honor nor respect for the truth. His unique preoccupation is to escape conviction and punishment.

The tendencies to criminalism appear to be increased by drug addiction as the incentive to stealing in order to obtain money for the narcotics, which they feel are indispensable to them, is very strong.

Many of the patients who were classified from their histories under criminalism, also showed marked emotional instability.

Paranoid personality, 29 patients (9%). In this type we find conceit and suspicion, and a stubborn adherence to a fixed idea; contempt for the opinions of others, bias of judgment leading to distortion of practical values, argumentativeness, and a tendency to develop persecutory trends.

Nomadism, 26 patients (8%). The nomadic or wandering tendency is present in most of us to some degree and, as all know, is in certain races so pronounced as to govern their mode of existence and social organization.

Inhibition of the wandering impulse sometimes fails in cases of mental deficiency, epilepsy, and various psychoses. It may be periodic or chronic.

Some cases have no underlying causes.

Sexual psychopathy,[35] 18 patients (6%), homosexuality. These patients all showed the stigmata and reactions which were characteristic.

In addition many patients showed tendencies that appeared to be masochistic, *e. g.*, pricking themselves with pins or needles during treatment or asking for "sterile hypos" after they were off treatment to get a "kick" out of it. This they termed "needle-mania" (the followers of Watson and Palov might call this a conditioned reflex).

Thus, if we exclude all those in the unclassified and inadequate personality groups, we still have about 56% who appear to have been constitutionally psychopathic.

However, most of those grouped as inadequate personality were probably also basically psychopathic, so we have between 56% and 87% of the patients who may well have been psychopathic before acquiring the state of drug addiction.

This leaves the 13.2% of the patients who were grouped as unclassified, and possibly normal personalities, for whom a fair prognosis might be given, which agrees somewhat with the figures given as representing the percentage of those who might be cured of the state of drug addiction.

Psycho-Neuroses. Besides the evidence of psychopathic personalities, many of the patients showed reactions which were typical of the hypochondriacal neurasthenic, or psycho-neurotic. This is not surprising, as the average drug addict is so morbidly interested in all his subjective symptoms, and bodily

complaints, all of which he interprets as a need for more drugs, that as soon as he is deprived of drugs, he acts like a typical hypochondriac.

It is also possible that many were psycho-neurotics before they began to use drugs.

Psycho-neurotic features such as hysteria, psychasthenia and neurasthenia manifested themselves during their period of observation.

Psychoses.—Only one patient was found to be suffering from a psychosis which was due to the use of morphine and atropine on the background of a psychopathic personality, with schizoid traits and periodic alcoholism. This patient was committed to a state hospital, and had two previous commitments on his record.

It is a known fact that the number of psychoses resulting from the use of opium or its derivatives is insignificant. Nearly all the patients admit a tendency to develop a psychosis when using cocaine to excess, the psychosis being characterized by terrifying visual hallucinations, delusions of persecution, and great excitement.

Drug addicts are apt to develop delirious states during the withdrawal of their drug, and there appears to be an increased tendency to delirium during atropine and hyoscine treatments and also when treated by some of the hypnotics. One patient developed an acute visual hallucinosis during an abrupt withdrawal.

Deterioration.—In respect to evidence of psychic deterioration under the prolonged use of narcotics, we have observed several changes, although there is little that is definite.

First, as we have mentioned above there appears to be an accentuation of any tendency to emotional instability, inadequate personality, criminalism, and psycho-neurotic reactions. There appears to be an impairment in many of them of the higher moral or ethical feelings.

Nearly all the patients say that the use of drugs makes them seclusive and asocial; *i. e.*, the use of drugs brings out the schizoid, seclusive element of their make-up.

As regards lying, this is an almost universal tendency, as the Psalmist once said, and even by so-called normal people, is frequently used as a defense mechanism.

Drug addicts will naturally use this means of defense at first as a result of shame and fear of the consequences of their drug habits.

However, later they develop a habit of lying about matters which do not touch upon their drug using.

Many of the patients show signs of pathological lying, concocting fabrications for no apparent reason, and lying even about trivial facts. That the use of narcotics accentuates these tendencies, the patients themselves vouch for. As a result they tend to exaggerate, and concoct phantasies for the pure love of sensationalism.

Adjustment.—Very few of the patients admit failure to adjust. Nearly all maintain that they can support themselves, although many admit that they work at irregular intervals only. In fact, if we take their word for it, obtaining money for their narcotics is one of the easiest things they can do.

For this reason, their own statements on this subject have little value in our estimation.

Undoubtedly, there were many failures among them judging by the shabby, penniless state of many of them on admission.

However, there were several in the group who from all accounts adjusted well and were fairly succesful and respected members of their community.

Summary.—(1) Thus, we find that the majority are of the poorer types both mentally and physically.

(2) The mental make-up is one of the most important factors in the onset and continuation of the state of drug addiction.

(3) While in general they were of average intelligence, 87% approximately appear to be constitutionally psychopathic. Many of them seem to use narcotics for the same reason other psychopaths use alcohol, etc., *i. e.*, as a sublimation or substitution mechanism to adjust their abnormalities (*e. g.*, homosexuality or emotional instability) to the satisfaction of the ego; in brief, psychopathic personalities and psycho-neuroses appear to be the basis for the addiction of many of them.

(4) A certain percentage of drug addicts, *e. g.*, some of the cases of marked emotional instability and hypomanic personalities and possibly some of the other types of psychopathic personalities, appear to be benefited by the use of their drug in moderation, and in this way are better able to adjust and sublimate their peculiarities and become useful members of society.

(5) In general, considering the type of drug addicts studied, the prognosis, in the majority of cases, appears to be poor.

Treatment.[38]

Limitations.—In view of the fact that a great many, if not all, of the patients in our group were found to be suffering from some mental abnormality or personality defects, besides the state of drug addiction, the objects of treatment have to be defined.

It was apparent from the number of "cures" most of them had received previously without success, that there was no such thing as a "specific" or, "cure" in the generally accepted sense, which will insure a permanent riddance of the habit.

These forms of treatment might be classed as immediate medical treatment and apart from psychotherapy, or removing medical or surgical causes for the addiction, their usefulness consists in allowing the withdrawing of the drug of addiction safely, with a minimum amount of distress to the patient, and in the shortest possible time.

In the work which we have carried out long-continued treatment for the purpose of a complete rehabilitation was impossible and we have confined our study to a critical analysis of the common methods of withdrawal, with the purpose of finding the safest and least disturbing method of unpoisoning the drug addict.

In brief the best practical management of the withdrawal period.

The average period of treatment was from two to three weeks or slightly longer in some cases, which we considered adequate for complete withdrawal.

Difficulties of Treating Drug Addicts.—The lack of cooperation and even active opposition of drug addicts, and their resourcefulness in defeating nearly all attempts to keep them from their drugs, are notorious.[1]

Unless a minute search is instituted on admission, they will very often succeed in smuggling in narcotics. If they fail at this time, they will devise innumerable ways and means of doing so after they are admitted. Strings, spoons, etc., will be dropped from windows, door and locks tampered with, window screens punctured, and openings forced in them; arrangements made with discharged patients, and bribes offered to any and all employees. To make strings, bed linen will be torn up needlessly. Their ingenuity knows no bounds.

Incidentally, drug vendors on the outside will meet their efforts more than half-way.

Where patients are unusually comfortable during withdrawal, they may be suspected of having illicit narcotics. On one occasion such a patient was discovered to possess a small rubber finger cot, filled with heroin, which he claimed to have swallowed before admission and later recovered after a bowel movement.

Another patient secreted a few morphine pills in a paper under his dental plate; another patient on admission was found to have a finger cot full of heroin attached by a piece of adhesive to the perineum.

No matter how sincere and apparently anxious they are to be "cured" on admission, there are very few drug addicts who will refuse to indulge in smuggled drugs while taking treatment, considering how they all believe its use to be a matter of self-preservation.

Several patients developed abscesses during their stay on the ward. In such a case, their conduct is interesting. Should this condition be the result (which was extremely rare) of an injection by a nurse, they will complain bitterly; but where they minimize it by saying it is the result of an injection before admission, they may be suspected of using smuggled narcotics on the ward or taking a jab with a safety pin ("pin-shot") for the psychic effect.

In other words, there is a constant battle of wits between drug addicts and those attempting to treat them. Their constant effort in many cases, is to render null and void these attempts by every conceivable means, and in fact, they derive a childish pleasure and satisfaction if at any time they are able "to put anything over" on those treating them.

They are very often both secretly and openly amused at attempts to "cure" them and despise these efforts as a waste of time and money and an encroachment on their "rights." This partly accounts for their irresponsible behavior under treatment, the lack of appreciation of what is done for them, and their general destructiveness (not a chair was left undamaged on the ward) while confined in the institution.

If the supervision is not close enough, or the officials caring for them are not sufficiently alert, or, if any of the employees should be dishonest, then the entire procedure deteriorates into a farce.

Patients suspected of having narcotics were immediately transferred to the Correction Hospital on Welfare Island. Uncooperative, abusive or violent patients were likewise removed; and at this point I wish to thank Wardens Schleth and McCann for their prompt cooperation in removing such disturbing elements from the ward.

Types of Treatment Given.—In a general way, we shall divide the treatments into four main groups: (1) Abrupt withdrawal or control treatment; (2) abrupt withdrawal with substitution treatment; (3) reduction treatments; (4) non-specific treatments.

In the abrupt withdrawal or control treatment the patients received injections of innocuous solutions at regular intervals after their morphine dosage was abruptly withdrawn, until all withdrawal symptoms were over.

In the abrupt withdrawal with substitution treatment, the morphine dosage was abruptly stopped and replaced by the non-narcotic medication given usually by hypodermic injection at regular intervals until all withdrawal symptoms were over, and in the case of the earlier narcosan treatments for some time after.

In the reduction treatment, morphine or some other opium derivative usually codeine was given by injection at regular intervals in decreasing amounts until all narcotics were withdrawn and saline hypodermics continued until all withdrawal symptoms were over.

In the abrupt withdrawal treatments, morphine was only given at rare intervals to control excessive suffering or to avoid collapse and death.

Non-Specific Treatments.—Under non-specific treatments will be described the results obtained by such symptomatic treatment as hypnotics, analgesics, and nervous depressants, alkalies, cathartics, astringents, stimulants, and physiotherapy, psychotherapy, diet, etc.

Withdrawal Symptoms.—In order to compare different treatments it is important to know the characteristic symptomatology and reactions of drug addicts to the withdrawal of their narcotic drugs. These are varied, but surprisingly distinctive, and more or less uniform in the majority of cases. The cause and explanation of these symptoms remains at the present time purely theoretical, although Pellini and Greenfield [37] have disproved Bishop's [38] theories of anti-bodies or toxins in the blood.

For the best picture of unaltered withdrawal symptoms we have used our observations of one hundred control patients who received injections of innocuous solutions at regular intervals after their morphine dosage was abruptly withdrawn, until all withdrawal symptoms were over. In these cases we see the characteristic symptoms in their full intensity over a shorter period of time.

Classification of Withdrawal Symptoms.—In general it is possible to subdivide the symptoms of the drug addict undergoing withdrawal of his accustomed narcotic into two groups: (1) Physical symptoms, (2) psychic symptoms. (A great many of the physical withdrawal symptoms seen in human addicts are presented in experimentally addicted animals (dogs usually) (Plant [39]), but in human addicts a very important psychic factor is super-

imposed, making the problem of withdrawing a human addict considerably different from that of an animal.)

Withdrawal symptoms may be subjective or objective.

In addition, the physical symptoms may be *real*—or they may be affected by the psychic factor so that they may be *simulated*. Still further they may be *exaggerated* or *minimized* deliberately.

If simulated or exaggerated, the object is usually to obtain more morphine or sympathy.

If minimized, *i. e.*, if their suffering is wilfully suppressed, or concealed, the patient's object is usually to effect his discharge sooner. As far as dissembling is concerned, some drug addicts are consummate actors.

Sometimes, as Light and Torrance mentioned in their article, patients who are in possession of smuggled narcotics will simulate suffering to allay suspicion.

Analysis of Withdrawal Symptoms.—Symptoms of withdrawal or abstinence may be referred to almost any organ in the body. The psychic symptoms are usually first to appear. The patient becomes restless, uneasy, and fidgety, not remaining very long in one position, *i. e.*, there is increased psychomotor activity of a disagreeable nature. He also shows fear, anxiety, and also some irritability.

The method of treatment at this stage may either quiet him, or exaggerate his symptoms, or excite him.

The fact that at this time mere assurance that he will be taken care of, or the giving of a sterile hypodermic will quiet him for quite a while, shows how important the mental factor is in the treatment of these cases.

However, should the patients be given to believe in his suspicious and apprehensive state that he may expect no relief, *i. e.*, that he is going to get "cold turkey," the fear of suffering may excite him, should he be one of the unstable types, to considerable excitement, which may be manifested by petulant destructiveness, or even assaultiveness, and occasionally some patients may become sufficiently disturbed, violent, or hysterical as to require restraint. Sometimes a depression with suicidal tendencies appears.

On the other hand, under similar situations some stoic addicts will lie in bed quietly, and as they term it, "kick it out," without a murmur.

Soon, within 12 to 24 hours, physical symptoms appear (the "yen" as addicts call it), and these at times alternate with or are modified, or exaggerated by the psychic element.

The patients complain of alternate hot or cold flashes, show vasomotor instability, may sweat profusely, or show blushing or erythema of the skin, or pallor and goose flesh. Sometimes the patients appear cyanosed. There may be slight rise of temperature for several days.

Then a multitude of other symptoms may appear in any number of combinations or degrees of severity.

There is an apparent increase of many of the bodily secretions; lachrymation, with dilated pupils; coryza, with sneezing and increased bronchial secretion with cough and expectoration, so that the patient complains that

he has a "cold in the head and chest." There may be yawning, with sighing or dyspnoea, or, only increased rate of respiration.

The pulse rate may remain unchanged or may show considerable fluctuation, becoming rapid or slow; small, weak, collapsible, thready, irregular or intermittent. The patient may complain of anginoid pains. The blood pressure in some conformity with the general vasomotor instability may show fluctuations, and there is often a fall in the systolic and diastolic readings. There may be a slight leucocytosis.

There may be salivation, with nausea, retching and vomiting, which may become so marked as to be blood-streaked, with terrible binding, colicky abdominal cramps, and more or less diarrhea. Sometimes the patients may vomit and have involuntary bowel movement simultaneously. The large amount of bile vomited in some cases may be significant. In some cases the patients put their fingers down their throats to induce vomiting when nauseated. Often also they complain of "heart burn" (pyrosis) with acid eructation. The abdominal cramps, vomiting, etc., may simulate an acute surgical condition.

With the anorexia, vomiting, inability to retain food or fluids, etc., there is a rapid loss of weight which may vary from a few pounds to twenty or more pounds in a few days. As a result the patients may show rapid emaciation; the change in their appearance may take place so quickly and be so marked as to make them appear to be entirely different individuals.[22] As a result of emaciation and dehydration, etc., there may be marked prostration, some times collapse.

In the genito-urinary system the patients may show a frequency of micturition, occasional albuminuria, or acetonuria; or increased sexual activity with numerous seminal emissions.

There are very constant painful, spasmodic muscular aches, and twitchings, which when very marked are called by the patient "twisters." There may be generalized fine tremors, simulating those of an alcoholic. Many patients complain of joint pains, and pains in the back (which they call "kidney trouble").

In the nervous system the symptoms may be very complex. First, there is a marked sleep disturance, patients sleep fitfully, at irregular intervals; often they remain awake all night, sleeping for short periods during the day time. Occasionally there is insomnia for several days.

There may be headache, disturbance of vision with diplopia, or dimness; and the senses of hearing, smell, or taste may be either impaired, or rendered more acute (the keen sense of hearing of some drug addicts is well known). Occasionally they complain of ringing in the ears.

There appears to be a generalized hyperesthesia to heat, cold, touch and painful stimuli; and some scarred veterans of the hypodermic, who had jabbed themselves on innumerable occasions with eye-droppers, safety-pins, horseshoe nails, and what not, will complain of the prick of a fine hypodermic needle. As they explain it their "nerves are all on the outside." Neuralgic pains may manifest themselves anywhere in the body, supra-orbital, facial, dental, intercostal, sciatic, etc. Some patients complain of testicular pain.

The tendon reflexes are usually increased.

Some patients may laugh or cry alternately, become hysterical, shout, curse, dash their heads or fist against the wall impulsively, or smash anything within reach. Sometimes they have a real or simulated convulsion or delirium, even a mild transitory psychosis, or mental confusion with impairment of memory. They become slovenly and untidy, expectorate in bed and on the floors. Some show exhibitionism.

All their psychopathic or psychoneurotic traits become exaggerated and obvious during the withdrawal period. The emotional tone is one of extreme dissatisfaction, and the patients become very capricious in their wants, making all kinds of requests, and often they become very finicky about their food.

Not every patient suffers all these symptoms. Some go through an abrupt withdrawal with little or no evidence of distress.

The amount of suffering during the withdrawal period is often an individual idiosyncrasy, but the amount of drug used, length of addiction and physical and mental condition have some bearing. The emotionally unstable types tend to exaggerate their symptoms. The greater the amount of drug used, the longer the period of addiction, also the older the addict, the more marked is the secondary cachexia apt to be and consequently the withdrawal period can reasonably be expected to be more stormy, and the recuperation or convalescence slower. However, this does not always follow, as their statements are often misleading.

In some patients the withdrawal symptoms are mainly of the nervous type, in others, the symptoms are predominantly gastro-intestinal. Some addicts maintain they always "break a habit" the same way, *i. e.*, they suffer the same type of withdrawal symptoms at every "cure," *e. g.*, such a one will say he always "breaks it in the stomach," *i. e.*, that his symptoms are mainly gastro-intestinal.

In the majority of cases the withdrawal symptoms are mixed in type; but as will be described later the type of treatment accentuates certain symptoms. Where there are excessive abdominal symptoms, the prostration is more marked.

The period of greatest suffering is reached at the end of the first 24 hours, as a rule, then for another 24 hours the severity maintains its peak, following this, the symptoms rapidly subside so that most of suffering is over after three days, or at the most four, in the majority of cases.

There is a diminished resistance during the withdrawal period, and infections may appear, *e. g.*, skin abscesses; one patient developed pneumonic symptoms, another acute otitis media.

Summary.—Thus we see that every withdrawal is a test of the addict's resistance and endurance. The suffering and release of nervous energy suppressed for a long time, place a severe tax on all the vital organs and the period of unrest, suffering, and semi-starvation may result in death.

Convalescence.

After 72 to 96 hours as a rule most of the withdrawal symptoms are over and a remarkable change occurs in the patients. They appear brighter and

younger. Their appetite returns in exaggerated form and they develop what they call the "chuck horrors,"—they seem to be unable to get enough to eat and they crave sweets. As a result they gain in weight rapidly and in a surprisingly short time look strong and healthy. All the abnormal physical signs which were incidental to the withdrawal disappear.

Many of them become euphoric, laughing and dancing, their mental reactions become clear and alert, and they begin to take a renewed interest in their personal appearance and life in general.

At this stage there is no apparent indication for any immediate medical treatment beyond a sufficient amount of nourishing food, rest, air, etc. The patients will refuse medication and declare they are through with drugs, and "never think about dope."

This is just for effect, however, and far from the truth. Nearly all show certain mental signs which are very significant. Although physically they soon return to health and strength and are able to do heavy muscular work, even the more powerful patients will at times complain of "weakness." As we interpret this, there is no physical weakness but a feeling of mental inadequacy (Adler's inferiority complex?), which they project as "weakness," and which is a strong incentive for them to revert to drugs, *e. g.*, taking a "pick-up."

While many of the patients show the euphoria we have mentioned, some, *e. g.*, the more debilitated and older addicts, do not show this quick reaction, but may recuperate somewhat more slowly, and in some there may be a period of restlessness and irritability.

"Craving for Narcotics."

As far as removing or, "obliterating the craving for narcotics" by immediate medical treatment, we have found this "craving" to be present after all treatments. The patients look forward to being discharged, in fact count the days, and if not discharged when they expect to be, some of them go into a state resembling frenzy, so great is their apparent eagerness to revert to drugs. Every imaginable excuse and pretext will be tried in order to be discharged sooner.

This gives a hint as to the prognosis, especially among the types studied, and where mass treatment is used.

Comparison of Treatments.

Reliability of Data and Observations.—In comparing the results obtained from different methods of treating the withdrawal period, it is important to know the criteria employed in estimating the degree of suffering, and how the symptoms were tabulated and checked.

One of the biggest problems in treating drug addicts is to distinguish between real and simulated symptoms. To do this the observer must have a knowledge first of the type of symptoms to be expected and looked for;

second, a knowledge of the personality of the patients; and, third, a knowledge of the reactions of drug addicts in general.

Special symptom sheets were drawn up by the physician in charge and a sufficient number printed by the Department of Correction for use on the narcotic ward. Most of the common withdrawal symptoms were tabulated on these and space arranged so that the patient's symptoms might be checked daily by the physician in charge, from his own observations, and from the reports of the three nursing shifts, and from close questioning of the patients. On each symptom sheet was pasted a photograph of the patient which was taken in the ward by the physician in charge.

In order that the nurses might not be biased in their reports of the patient's symptoms, symbols were used in naming treatments given and the nurses were unaware at the time of the content of these solutions. A leakage of information was prevented by the cooperation of the Pharmaceutical Department of Bellevue Hospital.

The nurses received careful instructions as to the symptoms which were to be closely looked for, and they cooperated very well, each nursing shift recording their findings in the nursing notes.

In obtaining a standard, all those symptoms which occur during the withdrawal period, and which could be considered as due to withdrawal were noted. However, many of these were of minor importance as far as the comfort of the patient was concerned, and it became evident that the accuracy of the observations and the careful grading of therapeutic effects would be greatly enhanced, if only those symptoms were considered which were most distressing to the patients.

Certain groups of symptoms were picked out which were most objective, and least likely to deliberate distortion, or dissembling by the patients, although it was impossible and inadvisable to entirely rule out subjective symptoms.

With the approval of the committee, these groups were finally cut down to four which were most comprehensive, and which gave the best index into the patient's actual sufferings. These were: (1) *Gastro-intestinal symptoms:* consisting of nausea, vomiting, abdominal cramps and diarrhea. (2) *Muscular discomfort:* consisting of muscular aches and twitchings. (3) *Restlessness:* both physical and mental, *i. e.,* increased psychomotor activity. (4) *Prostration:* consisting of subjective and objective weakness.

In the main, these are the symptoms most distressing to the patient, and of these the one most disturbing to all the patients was the gastro-intestinal group.

Each of these symptoms were graded as far as possible on the symptoms sheet, as illustrated, daily, by the physician in charge, as o—absent; moderate—one cross (x); marked—two crosses (xx); excessive—three crosses (xxx).

Later, also on the suggestion of Dr. M. S. Gregory, graphic charts were prepared from these symptom sheets.

By adding up the total number of crosses, from different patients' symptom sheets, on identical days of treatment, it was possible to compare the withdrawal symptoms of any group of patients with those of any other group composed of a similar number of patients who received a different treatment.

Abrupt Withdrawal—Control Treatment.—In order to have any comparison of the benefits from any of the measures tried out, it was necessary first of all to have a control standard for comparison, *i. e.*, a standard based on the behavior of addicts in the withdrawal stage with no treatment except that of a very general nature, *i. e.*, given no narcotic drug but given a solution similar in appearance to that given to patients definitely under treatment and at similar periods of time. This produced the full psychic effect of treatment, but except for the psychic element, was a full negative control for a narcotic treatment.

The patients receiving either control or other abrupt withdrawal treatments were both in complete ignorance of the nature of the treatment employed, and in fact, thought the same treatment was given each.

To establish the control standards observations on one hundred patients were carried out, which was considered a sufficient number to give a clear-cut picture of the symptoms of untreated withdrawal of narcotics.

In general, alternate patients were given control treatments until one hundred controls were obtained for comparison, *i. e.*, the control treatments ran concurrently with the other treatments.

The control treatment for "narcosan" consisted of injection of an innocuous solution colored (at the suggestion of Dr. Wm. R. Williams, the original chairman) to resemble the brownish "narcosan." After testing out various dyes with the assistance of Mr. Stowe, the pharmacist at Bellevue, Bismarck brown was chosen as best suited to color the control solution. The chemical name for Bismarck brown is meta-phenylene-diamine-disazobimeta-phenylene-diamine hydrochloride.

The solution labeled X had the following formula:

Saturated solution of Bismarck brown	gtt. 2
Glycerine	min. 15
Distilled water	to one oz.

The saturated solution of Bismarck brown is a 1% solution. In two minims there is 1/50 of a grain of Bismarck brown. In one minim of the final solution there is 1/24,000 of a grain of Bismarck brown. The average amount injected at a dose was 10 minims, or 1/2400 of a grain. The average number of injections was 15. Thus in one course of injections of the control treatment for "narcosan" the patient received one 1/160 of a grain of Bismarck brown.

The glycerine was added in order to give the injection a similar stinging sensation to that of "narcosan."

The control treatments for the atropine and hyoscine series consisted in injections of normal saline solution labelled XI at the same time intervals the other treatments were given to the atropine and hyoscine treatments.

Abrupt Withdrawal with Substitution Treatments—"Narcosan" Treatment.—The first substance investigated as a therapeutic agent was "Narcosan."[40]

"Narcosan" is a patent medicine which comes in the form of a brownish fluid in 1 c. c. ampoules. According to the article of Lambert and Tilney, "The patent papers show that narcosan is a solution of lipoids, together with non-specific proteins, and water-soluble vitamines.

"The theory on which narcosan was compounded was that of Myer and Overton regarding anesthetics that the narcotizing-substance enters into a loose physiochemical combination with the vitally important lipoids of the cell.

"The theory of the action of narcosan in the body is that narcotics such as morphine, called forth in the body certain protective substances to neutralize them. If the narcotics be suddenly withdrawn, and not given, these neutralizing substances are themselves toxic to the body. The lipoids in narcosan neutralize these toxic substances in place of the narcotic.

"After 72 hours because the withdrawal symptoms are over, these neutralizing reactions have ceased, the lipoids are then continued to replace the depleted lipoids in the body. The non-specific proteins of the narcosan solution are added to stimulate the blood forming tissues."

Comment.—The theories advanced in the above article for the action of narcosan have not been confirmed by chemical analyses of the blood of drug adicts. No depletion of lipoids has been ascertained, in fact the figures are practically normal.

Furthermore, in all our work on the control and the abrupt withdrawal with substitution treatment we have found that after 72 hours of abrupt withdrawal nearly all the withdrawal symptoms and suffering are over, the patient is on the road to recovery and nearly all need for immediate medical treatment is over also.

There appears to be no indication for further medicine either by injection or by mouth apart from occasional simple palliatives such as a few doses of the hypnotics; and no treatment at this time compares in results with those obtained by good food, rest, fresh air and sunshine, if possible. In other words, the remarkable power of the drug addicts themselves to recuperate rapidly, once they are unpoisoned, accomplishes all the results which have been, and still are being claimed for various so-called "specifics" or "cures." That is, the drug addicts naturally recuperate as any sick person would after an acute illness or the removal of a drug which interferes with nutrition, and if there has been no deterioration the stability and stamina of the system remains unimpaired.

Finally, even this recuperation does not necessarily constitute a "cure," but only a temporary interruption in the state of addiction, as the majority relapse sooner or later.

Results of "Narcosan Treatment."—In our series, 68 patients received "narcosan" treatment. The patients receiving "narcosan" and the accompanying controls were in complete ignorance of the nature of the treatment employed, and in fact thought the same treatment was given each.

Following the suggestion of Dr. Lambert, the patients were given on admission, two compound cathartic pills, of the following formula:

Calomel	1 grain.
Resin Jalap	3/10 grain.
Powdered Gamboge	¼ grain.
Ext. Colocynth	1¼ grain.

At 5.00 a. m. the following morning they received a dose of 1½ ounces of saturated solution of Epsom salts. This combination was found to give a generally satisfactory catharsis. It was found that too drastic catharsis in some cases precipitated marked gastro-intestinal symptoms. A few of the controls received a calomel series, *e. g.*, calomel grain ¼ with sodium bicarbonate, grains 5, every 15 minutes for 8 doses, followed by Epsom salts in the morning, with the result that there was a precipitation in some cases of vomiting and abdominal cramps. In a few cases, the c. c. pills were omitted, in others, the Epsom salts were omitted, but in general the combination of c. c. pills and Epsom salts was found to be effective and not too drastic.

In the few cases where withdrawal treatment was begun immediately after admission, the patients sometimes became almost unmanageable, with a combination of fear, excitement and physical withdrawal symptoms.

It was found that by keeping them comfortable on morphine for a day or two after admission, without any idea of reduction, eliminated a great deal of the element of fear, by giving the patient a chance to become accustomed to his surroundings and to be impressed with the fact that he was to be treated kindly, and not allowed to suffer unnecessarily, and in this manner reduced the psychic symptoms as much as possible.

Comment.—Although this angle was not mentioned in the article of Lambert and Tilney, the routine procedure incidental to the treatment of drug addicts at the Workhouse in many cases involved the patients being kept for several days at the Tombs, or Penitentiary, on a morphine treatment before they were received at the Workhouse for the "narcosan" treatment, with the possibility that some of them had partially reduced habits at the time they received the "narcosan" treatment. This may account for the difference in our results to those reported by Lambert and Tilney.

Preliminary.—Of the 68 patients receiving "narcosan" treatment, we found that 41 patients (60% approximately) were fairly comfortable before withdrawal on a daily ration of 3 grains of morphine. 17 patients (25% approximately) required 2 grains; 5 patients (7% approximately) required 1½ grains. 4 patients (6% approximately) required 4 grains; 1 patient (2% approximately) required 1 grain.

Of the 100 controls: 57% were comfortable on 3 grains; 18% were comfortable on 2 grains; 13% were comfortable on 4 grains; 8% were comfortable on 1½ grains; 3% were comfortable on 1 grain; 1% were comfortable on 5 grains.

Routine.—Usually, early in the morning, the morphine injections were stopped and "narcosan" injections substituted. These were given intramuscularly, in the muscles of the upper arm, or in the shoulder at the back of the arm.

The "narcosan" injections were given at first, as in the original article of Lambert and Tilney, every four hours for the first 24 hours, then every six hours for three days and nights, and then every 12 hours for three days, and then once a day for about ten days.

In the original article it stated, "As the narcosan is given to him he becomes less nervous and if the patient is excessively nervous an extra dose of narcosan can be given at the two-hour interval."

Again it stated of some patients, "these resent bitterly the obliteration of their narcotic craving by the third or fourth day."

Further, "They are tractible, subdued, and quiet, and soon appreciate that the hypodermics of narcosan relieve their symptoms, and they ask for an extra hypodermic from time to time."

Later, "These hypodermics do sting, and give a burning sensation."

Results.—Our findings agreed with the last quotation only. The injections of "narcosan" produced a local burning sensation which practically all the patients objected to. In some cases a localized swelling of the arm followed the injection and many of the patients insisted on taking all their injections in one arm in order that they might be able to lie comfortably on the other.

In general we found that the injections of "narcosan" relieved none of the withdrawal symptoms, but on the contrary aggravated many of them especially the gastro-intestinal group.[41, 42]

As in all the abrupt withdrawal treatments the patients quickly realized that the injections did not relieve their symptoms, and as a result most of them objected to the injections, more especially those of narcosan which were actually painful. Consequently, as soon as their withdrawal period was over (usually three to four days), they often refused to take any more injections, and at times in the case of "narcosan" of which the article of Lambert and Tilney specified a certain number of injections which we gave to our first narcosan cases, the injections frequently had to be given by force with threats of removal to the workhouse, and some patients at times threatened to strike the nurses who gave the injections, or insulted them. As a result the female nurses on the ward gradually dropped out and their places taken by male nurses who were less affected by the disorderly behavior of the patients.

Neither the number nor the frequency of the injections of narcosan affected the speed of convalescence compared to controls or hastened the occurrence. The only difference noticed was that the greater the number and the more frequent the injections of narcosan, the more painful were the areas injected and the more disgruntled the patients.

Occasionally at the suggestion of Dr. Lambert extra doses of "narcosan" were given at the two-hour intervals, or a double dose given when the patient was very uncomfortable, without any relief but with the result that those patients who received a greater number of injections of "narcosan" than their fellow patients thought they were being punished or ill-treated.

One patient received a double dose of narcosan without relief, instead he either had or simulated a convulsive seizure for a short time, requiring the keeper and several patients and nurses to control.

Consequently as no improvement could be observed in the patients' condition by continuing the injections of "narcosan" beyond the withdrawal period, the number of injections given to the patients was gradually reduced in order to relieve their suffering and for the sake of the morale on the ward.

This was done with the knowledge and approval of the committee.

The average number of injections of "narcosan" given to the "narcosan" treated was 15.

The "narcosan" used at first was obtained from the department of correction from their stock in daily use in cases of drug addiction at the workhouse. Later the supply was obtained directly from the manufacturers. There were no great differences in effect between the two lots. Neither showed any palliative qualities claimed for "narcosan."

General Analysis of Reaction to Narcosan.—Grouping the intensity of suffering under the different forms of treatment in terms which we believe are self-explanatory, as *severe, moderate,* and *light,* we found the results of the "narcosan" treatment to be as follows:

Of the 68 patients who received this treatment: 44 patients, or 65% approximately, had severe withdrawal symptoms. Included in this group are those cases whose sufferings were so intense as to threaten collapse, or death.

Fourteen patients, or 21% approximately, had moderate withdrawal symptoms.

Ten patients, or 15% approximately, had light withdrawal symptoms.

Of the 100 controls only 30% had severe withdrawal symptoms, 33% had moderate, and 37% had light symptoms.

Detailed Analysis of "Narcosan" Treatment.—The "narcosan" and control cases were watched very closely. The pulse rate was taken every two hours and charted. However, both the control and the "narcosan" cases showed the same tendency to variability of the pulse as mentioned under withdrawal symptoms, and also a slight rise of temperature for several days in many cases. At this point I would like to mention that true to their general erratic and incomprehensible and even somewhat amusing contrariness, the patients often refuse to have their temperature taken, and some touch the bulb of mercury of the thermometer to heated steam pipes.

However, comparing our four major symptom groups we found that the symptoms occurring in patients receiving "narcosan" were more severe than in those receiving no "narcosan." Injections of "narcosan" appeared to precipitate withdrawal symptoms sooner than the control treatment. The striking feature of "narcosan" treated withdrawal was the intensity of the gastro-intestinal symptoms. Vomiting was so marked and excessive that some patients thought there was apomorphine in it. The vomitus was often blood-streaked. The nausea, retching and vomiting in many cases kept up for three or four days until the dehydration, emaciation and prostration were startling. Often vomiting and diarrhea occurred simultaneously. Abdominal cramps were terrific, and the patients complained of the raw, burning sen-

sations in the abdomen. In addition many complained of "heart-burn" (pyrosis) with acid eructations.

These violent gastro-intestinal symptoms occurred in spite of the fact that we gave sodium bicarbonate in the large doses recommended by Lambert and Tilney in their article (30 grains every four hours). That the use of this bicarbonate was beneficial we have no doubt, for in ten controls and two "narcosan" cases in whom it was omitted, the gastro-intestinal symptoms were worse than in the alkalinized patients.

Sixty-two patients, or 90% approximately, of the "narcosan" treated cases suffered from vomiting which is one of the most distressing symptoms of withdrawal, compared to 82% of the controls who showed this symptom. 46 "narcosan" patients, or 70% approximately, of those taking this treatment suffered from diarrhea, compared to 41% of the controls.

In the original article it stated, "During the treatment, if the patients are very nervous and uncomfortable, hypodermics of one-sixtieth of a grain of strychnine or even one-thirtieth can be given every four hours, or even every two hours as the patient's need seems to demand.

"The one drug that seems to relieve their nervous restlessness is the strychnine."

Strychnine was given to the patients in 1/30 grain doses every four hours with the "narcosan" at periods of great restlessness. Thirty-four "narcosan" treated patients and twenty-six controls received such medication.

We were unable to elicit any benefit therefrom other than an occasional psychic one which could also be obtained by a sterile hypodermic.

The restlessness of the "narcosan" treated patients, the muscular discomfort, which includes muscular aches and twitchings, and the prostration were all more marked than in the control treated cases.

Sixty of the "narcosan" patients, or about 90% approximately, suffered from muscular twitching, compared to 88% of the controls. Six of the "narcosan" patients, or about 9% approximately, were slightly delirious or irrational during the treatment, compared to 6% of the controls.

As far as symptomatic treatment was concerned, *e. g.*, non-specific treatments such as hypnotics, analgesics, etc., all the results obtained by the use of such remedies in the control or abrupt withdrawal with substitution treatments were identical and will be described under the heading of non-specific treatments.

During the "narcosan" series we tried to limit the number of different drugs used in order that the issue might not be confused by "shot-gun" therapy so that the "narcosan" might stand or fall on its own merit.

In Lambert and Tilney's article it stated "no injections of morphine or heroin must be given. If these narcotics are given intense distress, nausea, and vomiting, headache, and a sense of benumbing collapse is produced. In fact, the administration of morphine or heroin can produce a serious collapse. If the patient succeeds in smuggling in narcotics and taking them, these symptoms soon are evident. The 'narcosan' treatment is self-protective against the patient indulging on the sly in narcotics."

As we have mentioned above, at first the "narcosan" treatment was followed out in all the details given in the original article. The patients in consequence endured for days all the agonizing suffering incidental to the "narcosan" treatment, no part of which mitigated these symptoms to any appreciable degree. We had been informed by Dr. Lambert of the danger of precipitating collapse by giving morphine to "narcosan" patients.

Later many patients mentioned that under the "narcosan" treatment at the workhouse some of the patients managed to smuggle in narcotics and used them, as one colored patient humorously, said, without, "turning green" or "dying" as the superstition claimed, in fact they declared it did them good.

For this reason we cautiously gave small injections of morphine ($\frac{1}{4}$-$\frac{1}{2}$ grain) to "narcosan" patients at the height of their withdrawal sufferings with immediate relief.

With the approval of the committee, similar treatment was given to 21 "narcosan" patients all of whom benefited thereby and in no case could any harmful effects be detected. Four patients were saved from approaching collapse by this means.

Later no patient was allowed to suffer excessively under any treatment if an occasional dose of morphine or codeine would relieve him, and it was found that such a "pick-up" would often break up the continuity of the withdrawal symptoms and make them less intense.

Most of the figures of non-protein and blood sugar given were those of patients undergoing either "narcosan" or control treatment, the blood having been taken at verious periods of withdrawal or soon after admission.

Johnson[42] also noticed a slight increase of non-protein nitrogen during withdrawal treatment.

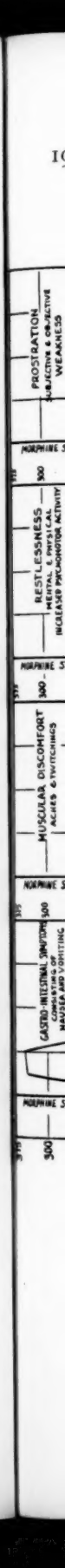
The high blood sugar figures agree with those obtained by Lambert and Tilney in their series. It must be noted, however, that our figures represent both control and "narcosan" treated patients.

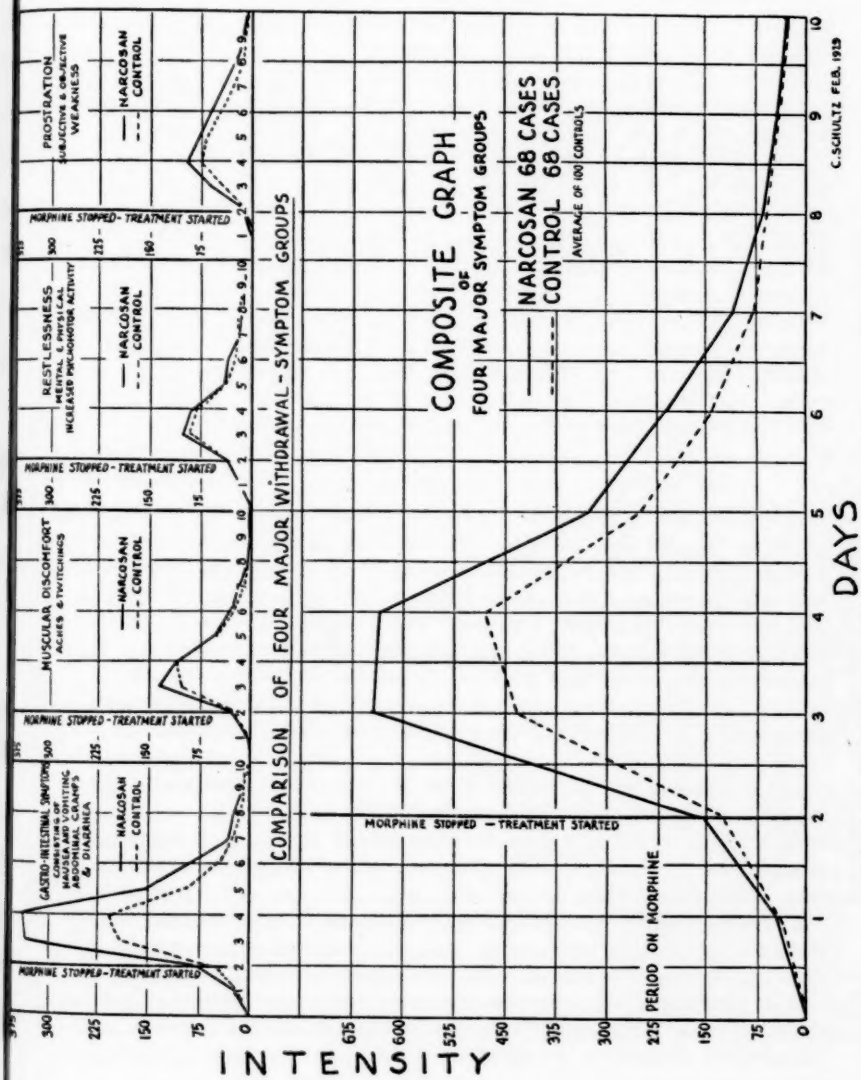
In addition urinalysis of control or "narcosan" cases under treatment showed the following: Acetone, 13 cases; albumen, 10 cases; casts, 1 case; white blood cells, 1 case.

Most of these, especially those showing acetone were in the "narcosan" treated patients, which also agrees with Lambert and Tilney. One "narcosan" patient developed marked albuminuria with granular casts and an acute purulent otitis media during treatment. The kidney signs all disappeared before the patients were discharged. The acetone was usually incidental to excessive vomiting with resulting semi-starvation.

We found sweating to be a universal accompaniment of all withdrawal treatments, and as the "narcosan" and many of the control treatments were carried out in the hot summer, and early fall, many of the patients perspired very freely.

As Lambert and Tilney pointed out occasionally patients complained of impairment of vision. Five "narcosan" patients, or 8% approximately, mentioned this symptom compared to 5% of the controls.




COMPARISON OF FOUR MAJOR WITHDRAWAL-SYMPTOM GROUPS
COMPOSITE GRAPH OF FOUR MAJOR SYMPTOM GROUPS
NARCOSAN 68 CASES
CONTROL 68 CASES
AVERAGE OF 100 CONTROLS
MORPHINE STOPPED — TREATMENT STARTED
INTENSITY
PERIOD ON MORPHINE
DAYS
GASTRO-INTESTINAL SYMPTOMS CONSISTING OF NAUSEA AND VOMITING ABDOMINAL CRAMPS & DIARRHEA
MUSCULAR DISCOMFORT ACHES & TWITCHINGS
RESTLESSNESS MENTAL EFFECTS INCREASED PSYCHOMOTOR ACTIVITY
PROSTRATION SUBJECTIVE & OBJECTIVE WEAKNESS
NARCOSAN
CONTROL
C. SCHULTZ FEB. 1929

COMPARATIVE GRAPH OF "NARCOSAN" AND CONTROL TREATMENTS.

The average leucocyte count of patients undergoing "narcosan" or control treatment was 8355.

If anything the control patients recuperated more quickly than those who received "narcosan," as they were not so devastated by the gastro-intestinal suffering incidental to "narcosan" treatment.

The description of convalescence applies in general to both control and "narcosan" patients. The comment on "craving for narcotics" also applies to both control and "narcosan" patients.

Summary.—Thus we have seen: (1) That the "narcosan" treatment is not a "specific" for drug addiction. (2) "Narcosan" does not alleviate any of the withdrawal symptoms, on the contrary, all, and especially those of the gastro-intestinal group, were more severe than those of the control patients. The combination of abrupt withdrawal and exaggerated gastro-intestinal symptoms incidental to "narcosan" treatment involves danger to life in patients who are aged, decrepit or suffering from serious organic disease such as pulmonary tuberculosis, cardio-vascular-renal disease, or gastric or duodenal ulcer, etc. (3) There is no "obliteration of the craving for narcotics" by "narcosan" treatment. (4) Finally, "narcosan" treatment is not "self-protective against the patient indulging on the sly in narcotics."

Abrupt Withdrawal with Substitution Treatments.

Belladonna Group. Atropine Treatment. Preliminary.—Many historic and so-called "specific" treatments for narcotic drug addiction include the use of one or another of the Belladonna group of drugs as the basis of the treatment and the principal therapeutic agent. Among these treatments are those of Lott,[43] Petty,[44] Albright,[45] Lambert,[18] and Sceleth.[20]

These are all atropine or hyoscine treatments given in a more or less complicated manner, with other accessory drugs and with various modifications such as reduction, catharsis, stimulation, etc., and all put forward as "cures" or "specifics." Atropine has always been generally accepted as being an antidote to morphine.

For this reason it was decided to try out the active principles of Belladonna in the form of the alkaloidal salts, Atropine sulphate or Hyoscine hydrobromide, in sufficient doses to obtain the full physiological and pharmacological effects in order to observe any reputed value in the treatment of drug addiction. Atropine was the drug first used on a series of 25 patients.

Of the 25 in the Atropine group: 13, or 52%, were comfortable before withdrawal treatment on a daily ration of 3 grains of morphine; 8, or 32%, were comfortable on 4 grains; 4, or 16%, were comfortable on 2 grains.

The preliminary catharsis and accessory treatments were the same as described under control and "narcosan" treatment, and the morphine ration discontinued abruptly as described under "narcosan" treatment, and Atropine injections substituted and given at definite time intervals.

A solution of Atropine sulphate was prepared by the pharmaceutical department of Bellevue Hospital after the following formula:

Atropine sulphate	grain 1/200
Normal saline	to minims, 10

The solution was labelled X-2 in order that the nurses might not be aware of its actual content, although they were informed of the effects of Belladonna poisoning and instructed to look for these signs.

The injections were given as follows: After the morphine ration was discontinued, Atropine sulphate was injected subcutaneously, the first injection being 1/100 of a grain. This was followed by three doses of 1/200 of a grain every two hours for three doses and then 1/200 of a grain every four hours until all withdrawal symptoms, or signs of over-dosage occurred.

The average number of injections given to each of the Atropine patients was 21, *i. e.*, about 11/100 of Atropine sulphate to each patient given over a 48-72 hour period in most cases.

General Results.—Of the 25 patients who received the Atropine treatment, ten or 40% had severe withdrawal symptoms compared to 30% of the controls. Ten patients or 40% had moderate withdrawal symptoms compared to 33% of the controls.

Five patients or 20% had light withdrawal symptoms compared to 37% of the controls.

In brief, Atropine gave no indications of being a specific as far as alleviating any of the sufferings which follow the abrupt withdrawal of morphine in cases of drug addiction.

Detailed Results.—Taking our four major symptoms groups as a basis, the gastro-intestinal symptoms of the patients receiving the Atropine treatment were slightly less as the diarrhea was diminished, but the vomiting which is the most distressing individual symptom, was equally as marked as in the controls.

Twenty-two of the Atropine patients or 88% suffered from vomiting compared to 82% of the controls; four Atropine patients or 16% showed diarrhea compared to 41% of the controls.

The muscular discomfort consisting of aches and twitchings were not relieved by the use of Atropine, as the control group was no worse in this respect than those receiving Atropine, in fact this symptom appeared to be of longer duration in the Atropine group.

Twenty-four of the Atropine patients, or 96%, showed muscular twitching compared to 88% of the controls.

The restlessness was more marked in those receiving Atropine, in a few cases amounting to a delirium; and prostration was equal in intensity to the controls and somewhat more prolonged. Also the loss of weight of the Atropine patients was equal to that of the control cases.

Thus as far as our four major symptom groups were concerned, doses of Atropine in sufficient amount to produce full pharmacological results failed to alleviate the symptoms of morphine withdrawal.

Furthermore, these doses were sufficient to produce added symptoms which were incidental to Belladonna intoxication as follows:

Nearly all the patients receiving Atropine complained of dryness of the mouth, and a few showed difficulty of swallowing.

Nine patients or 36% complained of impairment of vision, compared to 5% of the controls, and nearly all had dilated pupils, which occurs in morphine withdrawal as a rule, regardless of the use of Atropine.

The amount of Atropine given was sufficient to induce in three of the Atropine patients or 12%, a slight delirium compared to 6% of the controls.

In addition there was a slight diminution of the amount of perspiration in the Atropine patients.

Convalescence.—The use of Atropine in the doses mentioned appeared to prolong the withdrawal period slightly, but, in general, convalescence occurred quite as satisfactorily as in the controls.

Summary.—(1) Atropine showed no indications of specificity in respect to alleviating the withdrawal symptoms of morphine addiction. (2) The withdrawal symptoms of drug addicts who receive Atropine in full doses were equally as severe as in control patients undergoing abrupt withdrawal. (3) In addition to suffering the same withdrawal symptoms as control patients, those who received the Atropine treatment also suffered from additional symptoms which were incidental to Belladonna intoxication. (4) There was no evidence of the "obliteration of the craving for narcotics" by the use of full doses of Atropine.

Belladonna Group. Hyoscine Treatment. Preliminary.—Atropine having failed to show any value in the treatment of morphine withdrawal, it was decided to make a study of the effects of Hyoscine in small doses, given hypodermically, at definite intervals following the abrupt withdrawal of morphine.

Hyoscine is a potent drug to which idiosyncrasy is common and poisonous symptoms are known to occur after small doses of the purest samples, and there is a strong tendency to delirium under Hyoscine treatment. Many institutions use Hyoscine as a means of withdrawing narcotics. Whereas in these institutions Hyoscine is given in fairly large doses in order to throw the patient quickly into a state of delirium which is maintained for about 72 hours, it was the object of the committee to give the drug in small doses with the idea of avoiding, if possible, a state of delirium.

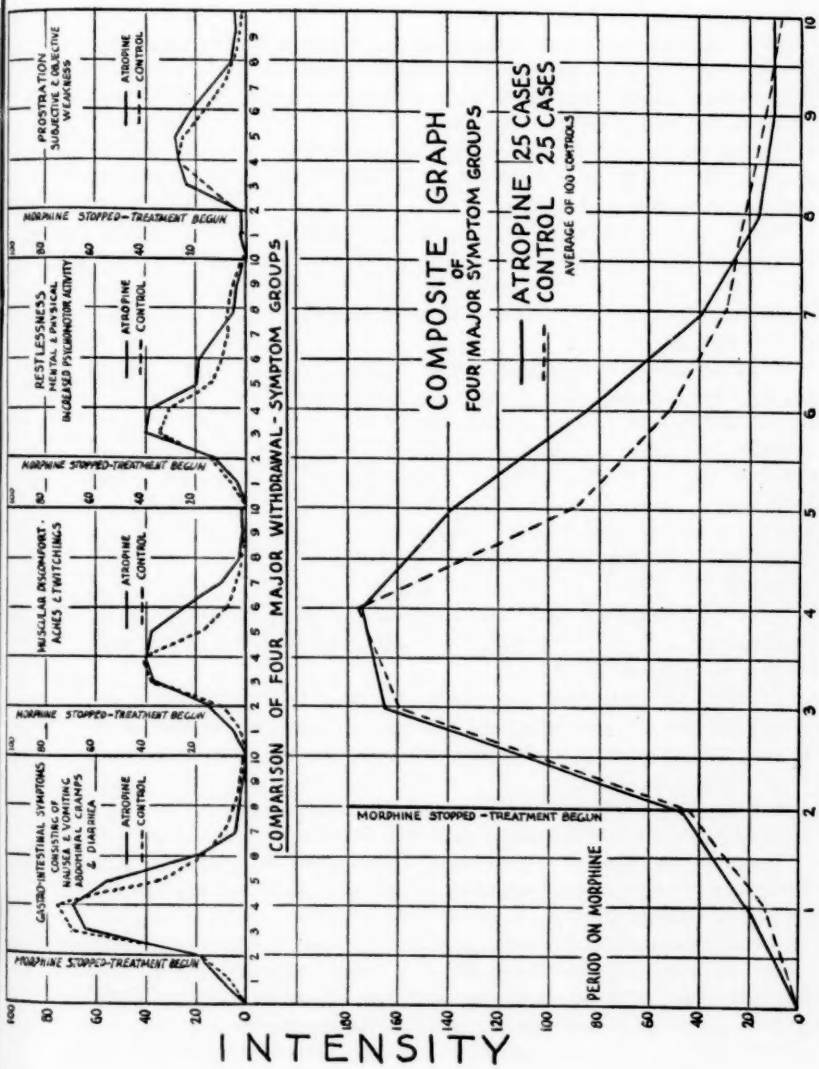
In order to get the most accurate results, freshly prepared solutions of pure levo-rotary Hyoscine hydrobromide were used. The drug was obtained from Merck.

Twenty-five patients received the Hyoscine treatment. Of these, 24 patients or 96% were comfortable before withdrawal treatment on a daily ration of 3 grains of morphine. One patient, or 4%, were comfortable on 4 grains.

The preliminary catharsis and most of the accessory treatment were the same as described under the control and "narcosan" treatment with the difference that magnesium oxide gr. XV was given every four hours instead of sodium bicarbonate gr. XXX, with the result that the gastro-intestinal symptoms were slightly more marked than in the control.

A solution of Hyoscine hydrobromide was prepared by Dr. Neuwirth after the following formula:

Hyoscine hydrobromide ..... grs. 1/400
Normal saline ..... to minims 10



COMPARATIVE GRAPH OF THE ATROPINE AND CONTROL TREATMENTS.

The solution was labelled X-3 in order that the nurses might not be aware of its actual content, although they were instructed to look for signs of delirium, when treatment was to be discontinued.

The Hyoscine was given as follows:

After the morphine ration was abruptly discontinued, the Hyoscine hydrobromide was injected subcutaneously in 1/400 grain doses every four hours for four doses, then every six hours until withdrawal symptoms were over, or sooner if signs of delirium appeared.

The average number of injections per patient was ten, *i. e.*, about 1/40 grain of Hyoscine hydrobromide was given to each, this amount being given over a period of 48 hours in most cases.

General Results.—Of the 25 patients who received the Hyoscine treatment, 5 or 20% had severe withdrawal symptoms compared to 30% of the controls; 13 or 52% had moderate withdrawal symptoms compared to 33% of the controls, and 7 or 28% had light withdrawal symptoms compared to 37% of the controls.

In brief, Hyoscine in the doses given failed to show any tendency towards relieving the symptoms incidental upon abrupt withdrawal of narcotics, or any advantage over control treatment.

Detailed Results.—Comparing the four major withdrawal symptom groups with the controls we found, if anything, that the gastro-intestinal symptoms were slightly worse in the Hyoscine patients than in the controls, with a possibility that the substitution of magnesium oxide in place of the sodium bicarbonate was partly responsible.

Twenty of the Hyoscine patients or 80% suffered from vomiting compared to 82% of the controls; 9 Hyoscine patients or 36%, showed diarrhea, as compared to 41% of the controls, showing that Hyoscine diminished the tendency to diarrhea slightly.

The muscular discomfort was practically equal in degree to that of the control patients. 24 Hyoscine patients or 96% (which is the same per cent as in the Atropine Series) showed muscular twitching compared to 88% of the controls.

Restlessness was more marked among the Hyoscine patients, and a considerable number of the Hyoscine patients became irrational and delirious.

Prostration was considerably worse in the Hyoscine group and the tendency of Hyoscine treatment to leave drug addicts in a weakened physical condition is well known.

Loss of weight of the Hyoscine patients was equal to that of the controls.

Thus as far as our four major symptom groups were concerned, doses of Hyoscine which in some cases was sufficient to induce delirium failed to mitigate any of the withdrawal symptoms to an appreciable degree.

Furthermore, other symptoms incidental to Hyoscine intoxication were present as follows:

Fifteen patients, or 60%, showed a slight delirium, compared to 6% of the controls, and here it was noted that some patients became delirious after a very few injections of Hyoscine; 13, or 52%, showed impairment of vision,

compared to 5% of the controls; 13, or 52%, complained of dry mouth; 10, or 40%, suffered from visual hallucinations or illusions.

The minor symptom of sweating was slightly diminished in the Hyoscine patients.

Convalescence.—Considering the small doses given, the Hyoscine patients recuperated quite as readily as the controls.

Summary.—(1) No amelioration of symptoms was obtained by the use of Hyoscine in the withdrawal of morphine and heroin. On the contrary, there was a definitely increased tendency to prostration and restlessness, and in addition the patients' discomfort was aggravated by other symptoms incidental to Hyoscine intoxication, the chief one being an hallucinatory delirium. (2) We have found no evidence of specificity in the drugs of the Belladonna group in the withdrawal treatment of drug addiction. (3) There appeared to be a definite tendency to delirium on the part of drug addicts treated by Atropine or Hyoscine, this result often following rather small doses of Hyoscine.

General Summary of All the Abrupt Withdrawal Treatments.—(1) In all of them the patients undergo the full intensity of all the withdrawal symptoms. None of these treatments mitigates to any degree any of these symptoms. There is always danger of collapse and death under these forms of treatment. (2) In all of these treatments the gastro-intestinal group of symptoms is the most marked and most distressing to the patients. (3) "Narcosan" treatment aggravates the gastro-intestinal symptoms. (4) Atropine increases the restlessness and produces additional symptoms of Atropine intoxication. (5) Hyoscine increases the prostration and tends to induce an hallucinatory delirious state. (6) None of these treatments is a specific for drug addiction; the term "cure" is a fallacy, at least.

Psychological Reactions to Abrupt Withdrawal Treatments.

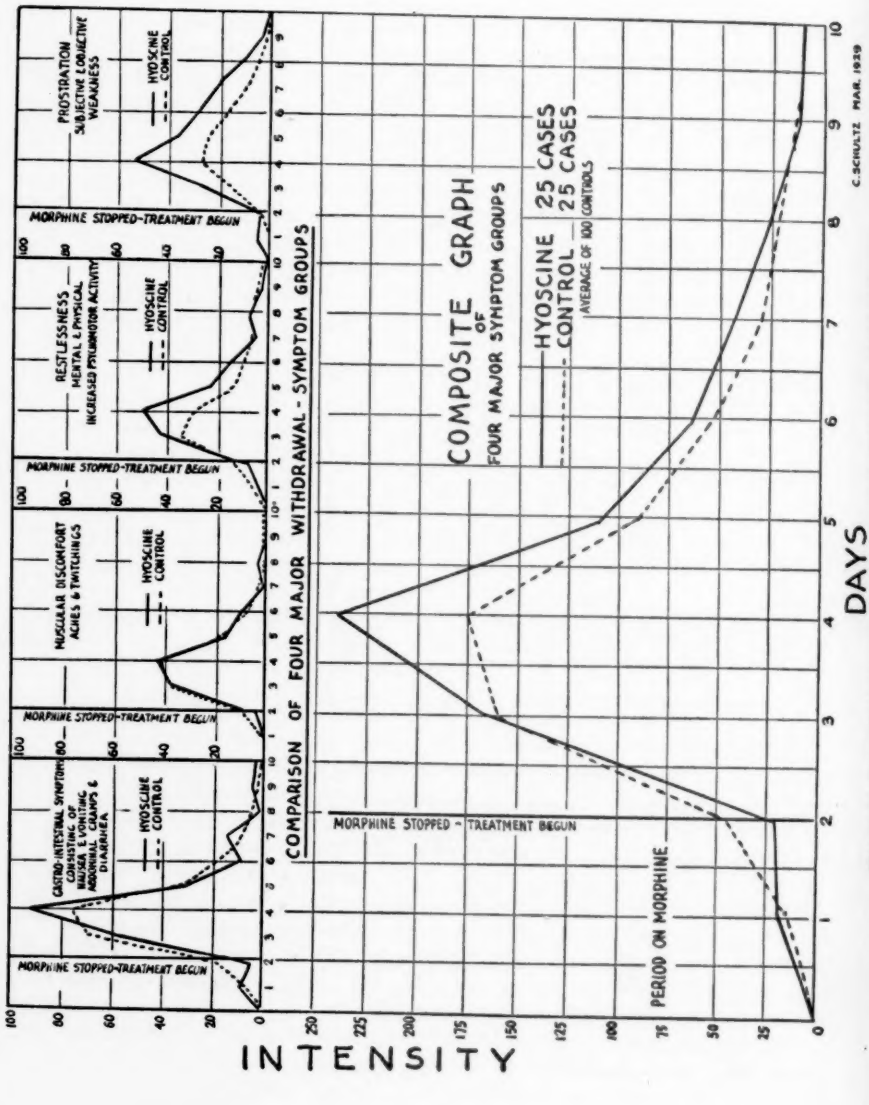
There are good and bad features about abrupt withdrawal treatments, and the patients' responses are considerably different to those of reduction treatments, as will be described after the section on reduction treatments.

In view of the mental make-up of drug addicts in general, the psychology of treatment is very important and must be altered to suit the individual case, if possible.

Under abrupt withdrawal treatments, as carried out in our study, with the first withdrawal symptoms, the patients often begin to show regret for coming in, ask for a "shot," or a "pick-up," and beg or demand to be discharged. They become pessimistic, discouraged, lose their judgment of values and act in a petulant, childish manner.

They become irritable, restless or surly, insult the nurses, curse all those caring for them, and accuse them of being cruel.

They quickly realize that the injections do *not* contain morphine and do *not* relieve their symptoms, and in fact blame them for their withdrawal symptoms, *e. g.*, when they vomit they insist there must be apomorphine in the treatment.


COMPARISON OF FOUR MAJOR WITHDRAWAL-SYMPTOM GROUPS
COMPOSITE GRAPH OF FOUR MAJOR SYMPTOM GROUPS
HYOSCINE 25 CASES
CONTROL 25 CASES
AVERAGE OF 100 CONTROLS
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HYOSCINE CONTROL
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COMPARATIVE GRAPH OF HYOSCINE AND CONTROL TREATMENTS

For this reason they take their treatment under protest, try to avoid some injections by saying they had already received them, and sometimes refuse to take them and beg to be taken "off-shots" as quickly as possible.

Often they have to be forced to take their treatment, and sometimes only do so under threat of transfer to the workhouse.

However, as the result of the abrupt withdrawal the patients are, as a rule, prostrated by their symptoms, incapable of much active opposition, and their surliness and suffering only last a short time.

On this account the handling of drug addicts is much simplified under abrupt withdrawal as the period of suffering and necessary medical and nursing treatment is much shorter; in fact, the patients ask frequently "as a favor" to be taken off treatment as soon as possible.

In order to do this they sometimes try to minimize their suffering, saying they feel well, in order to get off the "treatment" as quickly as possible as they think they will suffer less if they receive a fewer number of injections.

This, of course, is where there is no alternative to taking the treatment than transfer to the workhouse, and where no morphine is given.

If they know that no morphine will be given to them they quickly adjust to this idea, and realizing the futility will soon cease to ask for any; but if "pick-ups" are given them they will constantly ask for them (this under any form of treatment), and they will exaggerate their symptoms in order to obtain morphine.

However, where the treatment is strict withdrawal with no "pick-ups" there is an incentive to a quick recovery physically and mentally in order to get through with the treatment which is so distasteful to them.

The reaction after an abrupt withdrawal usually comes rapidly and is often very satisfactory. The patients are so intensely relieved that their agony of several days' duration is over, that they frequently react by a noticeable euphoria and feeling of well being.

They also realize that they are not getting opiates and that for the time being at least they are able to exist comfortably without narcotics, that is they are free of the periodical illness which necessitated their usual opium dosage.

Under the proper conditions this euphoric reaction might be used to good advantage as far as rehabilitating the addict and keeping him off drugs, but, as we shall describe later in the section on Rehabilitation, mass treatment is not conducive to reform even in well-disposed and fairly normal drug addicts, as the majority of the patients continue both secretly and openly to talk about drugs, and most of the patients soon look forward to discharge and a return to the Poppy.

Reduction Treatments.

Seven Day Reduction.—As no relief of the abstinence symptoms was observed in any of the abrupt withdrawal treatments, it was decided to make a study of the well-known methods of reduction.

It was also decided to compare the difference between a shorter and a longer or more gradual period of reduction.

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Accordingly one series of 25 patients received a seven day reduction treatment, and another series of 25 patients received a 14 day treatment. In general, alternate patients received the 7 or 14 day treatment.

These patients were kept comfortable on daily rations of morphine given at four hour intervals, for several days before the reduction was commenced, in order that their morphine balance might be ascertained, *i. e.*, that amount necessary to control all withdrawal symptoms so that the withdrawal might be started at a point where the patient was comfortable.

Magendie's solution of which 7 minims is equivalent to ¼ of a grain of morphine sulphate, was the form in which the narcotic was administered. All hypodermics were made up to minims XXX with normal saline so that the patient might not be aware of the rate of reduction.

In the seven day reduction treatment, one-seventh of the amount of morphine necessary to keep the patient comfortable was withdrawn each day. Injections were given every four hours.

Thus in seven days all morphine was withdrawn and the patient kept on hypodermics of normal saline every four hours until all withdrawal symptoms were over.

Of the 25 patients who received the seven day reduction treatment: 18 or 72% were comfortable before the reduction started, on a daily ration of 3 grains of morphine; 6 or 24% were comfortable on 4 grains; 1 or 4% was comfortable on 6 grains.

The catharsis consisted of one ounce of castor oil given on admission, with occasional doses of an ounce or an ounce and a half of saturated solution of Epsom salts during the course of the treatment when necessary. The accessory treatments were the same as in the control cases.

General Results.—Of the 25 patients who received the seven day reduction treatment, only 2 patients or 8% had severe withdrawal symptoms compared to 30% of the controls; 7 patients or 25% had moderate withdrawal symptoms compared to 33% of the controls; and 16 patients or 64% had light withdrawal symptoms compared to 37% of the controls.

Thus for the first time we noted a definite tendency to amelioration of the suffering incidental upon morphine withdrawal as treated by reduction compared to control treatment of abrupt withdrawal; with a lessening of the danger of collapse, which is always possible in abrupt withdrawal.

Detailed Results.—Taking our four major symptom groups as a basis, the gastro-intestinal symptoms of the patients who received the seven day reduction were only about one-half as severe on complete withdrawal as in the control cases where an abrupt withdrawal was the treatment.

Only 17 patients or 68% of those receiving the seven day reduction treatment suffered from vomiting compared to 82% of the controls.

Six patients or 24% suffered from diarrhea compared to 41% of the controls. Diarrhea was so little in evidence that, in fact, some patients required cathartics.

The muscular discomfort consisting of aches and twitchings was less than that of control patients. 16 of the reduction patients or 64% complained of this symptom compared to 88% of the controls.

The restlessness was somewhat prolonged in the reduction series, but did not reach the same intensity as that of the controls, and here it may be noted that there were mild withdrawal symptoms present all during the course of the reduction with an accentuation as soon as complete withdrawal was affected. During every withdrawal whether abrupt or gradual the patients are often irritable and in a reduction treatment this period of irritability may be prolonged for as long as the reduction continues.

The prostration of the patients undergoing reduction treatment was considerably less than that of control patients undergoing abrupt withdrawal.

Thus in every one of the four symptom groups the reduction patients suffered less than the controls.

None of the reduction patients complained of impairment of vision or showed delirium.

Convalescence.—All through the course of the reduction treatment, the majority of the patients were able to retain nourishment, and while their appetites were not marked, managed to eat a sufficient quantity to maintain their weight and support their strength.

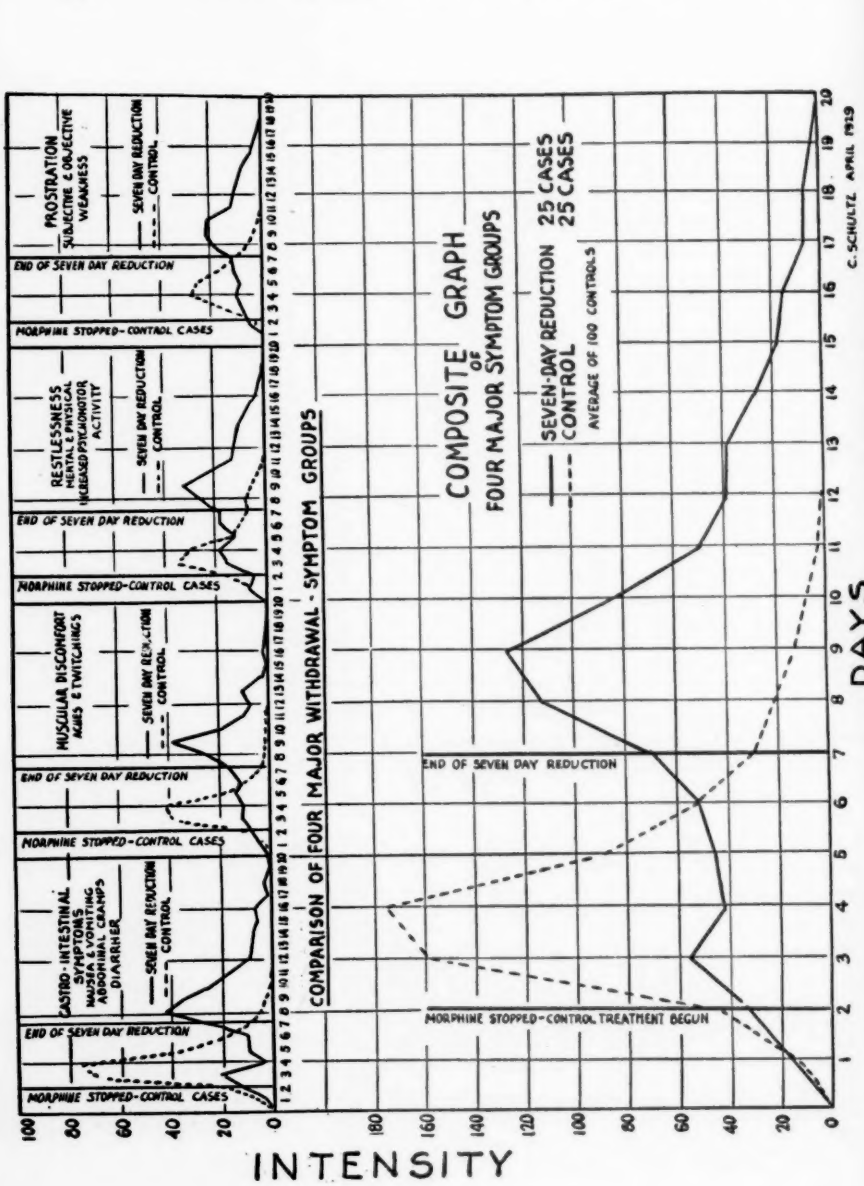
In addition when complete withdrawal was effected there was not the same intensity of suffering or the same degree of starvation incidental to the marked gastro-intestinal symptoms of the abrupt withdrawal treatments. In consequence they did not lose as much weight as the controls, most of the reduction patients only varying a few pounds in weight compared to the considerable loss of weight shown by the patients undergoing abrupt withdrawal.

As a result, when free from all withdrawal symptoms, the reduction patients were not so debilitated and recuperated quickly physically. However, as they were not suffering from the same degree of starvation as the controls, there was not the same noticeable ravenous appetite or "chuck horrors" as after the abrupt withdrawal treatments; their appetites remained more normal and they gained in weight steadily.

Summary.—(1) Very few of the patients had severe withdrawal symptoms in the seven day reduction treatment. (2) The seven day reduction treatment lessened the severity of all the withdrawal symptoms compared to the controls and other abrupt withdrawal treatments. (3) The gastro-intestinal group of symptoms which is the one most distressing to the patients was only half as severe in the seven day reduction as in the control cases. (4) There is less of a tax on the physical resources of the patients undergoing a reduction treatment than in the control or abrupt withdrawal treatments, there is less danger of collapse, and they are less debilitated after complete withdrawal is effected than the patients undergoing abrupt withdrawal treatments. (5) Convalescence takes place as readily and even more so in the reduction cases as in the controls.

Fourteen Day Reduction.—Running concurrently with the seven day reduction, a series of 25 patients were given a 14 day withdrawal treatment.

Preliminary treatment and general management was the same as described for the seven day reduction with the exception that in the 14 day reduction 1/14 of the patient's balance ration of morphine was withdrawn


COMPARISON OF FOUR MAJOR WITHDRAWAL - SYMPTOM GROUPS
GASTRO-INTESTINAL SYMPTOMS NAUSEA & VOMITING ABDOMINAL CRAMPS DIARRHEA
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SEVEN DAY REDUCTION
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COMPOSITE GRAPH OF FOUR MAJOR SYMPTOM GROUPS
SEVEN-DAY REDUCTION 25 CASES
CONTROL 25 CASES
AVERAGE OF 100 CONTROLS
MORPHINE STOPPED-CONTROL TREATMENT BEGUN
DAYS
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COMPARATIVE GRAPH OF THE SEVEN DAY REDUCTION AND CONTROL TREATMENTS

daily until complete withdrawal with the substitution of saline hypodermics was effected, and these saline hypodermics continued until all withdrawal symptoms were over.

Of the 25 patients who received the 14 day reduction treatment: 15 patients or 60% were comfortable before reduction on 6 grains of morphine daily; 2 patients or 8% were comfortable on 4 grains.

General Results.—Of the 14 day reduction group only one or 4% had severe withdrawal symptoms compared to 30% of the controls; only three or 12% had moderate withdrawal symptoms compared to 33% of the controls; and 21 or 84% had light withdrawal periods, compared to 37% of the controls.

We found that in general the 14 day reduction group had the easiest withdrawal, much lighter than the controls, and lighter even than the seven day reduction, in fact there were only one-half as many severe and moderate withdrawals in the 14 day group as there were in the seven day group.

Thus it appeared that the longer the reduction, *i. e.*, the more gradually the morphine was withdrawn, the less the patients suffered from withdrawal symptoms, and the less the danger of collapse, which is always possible under abrupt withdrawal.

Detailed Results.—Taking the same four major symptom groups we have by now so frequently used as a basis, we found that the gastro-intestinal symptoms (always remembering that this is the group most distressing to the patients and most likely to precipitate collapse) were reduced so noticeably by the 14 day withdrawal treatment as to become almost negligible, as compared with the abrupt withdrawal treatment and only half as severe as in the seven day reduction treatments.

Only 10 patients or 40% suffered from moderate vomiting as compared to 82% of the controls wherein it was more marked, and 68% of the seven day reduction series where it was less marked.

Only 4 patients or 16% of the 14 day series suffered from mild diarrhea compared to 41% of the controls where it was more marked, and 24% of the seven day group.

As we mentioned under the seven day reduction series the diarrhea was so far diminished in the 14 day group, that in fact some patients complained of constipation and asked for cathartics.

The muscular discomfort was less in the 14 day series than in the controls and also less than in the seven day group.

Sixteen patients or 64% of the 14 day group (which was the same number as in the seven day series) complained of muscular twitching compared to 88% of the controls.

The restlessness was less than the controls and the tendency to prolongation was not so noticeable as in the seven day series as the longer and more gradual withdrawal eased their symptoms in general so that the restlessness and irritability was less than in the seven day group. Of course, in the abrupt withdrawal treatment, the irritability reached disagreeable proportions during the few days of intense suffering, but only lasted for a short period.

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Thus in every one of the four major symptoms groups, the 14 day reduction was a great improvement on the control treatment and better even than the seven day reduction.

None of the 14 day group showed any delirium or impairment of vision.

Convalescence.—The statement on convalescence applies in every detail to the 14 day reduction group as to the seven day group.

Summary.—In general, the summary given for the seven day reduction series applies also to the 14 day reduction treatment. Furthermore, in every respect the 14 day reduction was better than the seven day reduction as far as alleviating the withdrawal symptoms and the most distressing gastro-intestinal symptoms were very definitely diminished in the 14 day group.

Rapid Reduction with Codeine Treatment.—After the 7 and 14 day gradual reduction treatments, it was decided to study the effect of a more rapid type of morphine withdrawal, with the added support of codeine, the use of which was suggested by Dr. Lambert, and which was found by frequent trial to be one of the very few drugs which relieved the patients at times of severe withdrawal suffering. It was found that doses less than 3 grains were not sufficiently potent where the patient was suffering severely, but when the withdrawal symptoms were mild or abating smaller doses of codeine, *e. g.*, 1 or 2 grains were effective also.

The codeine was used in the form of codeine phosphate which was given hypodermically in a solution having the following formula:

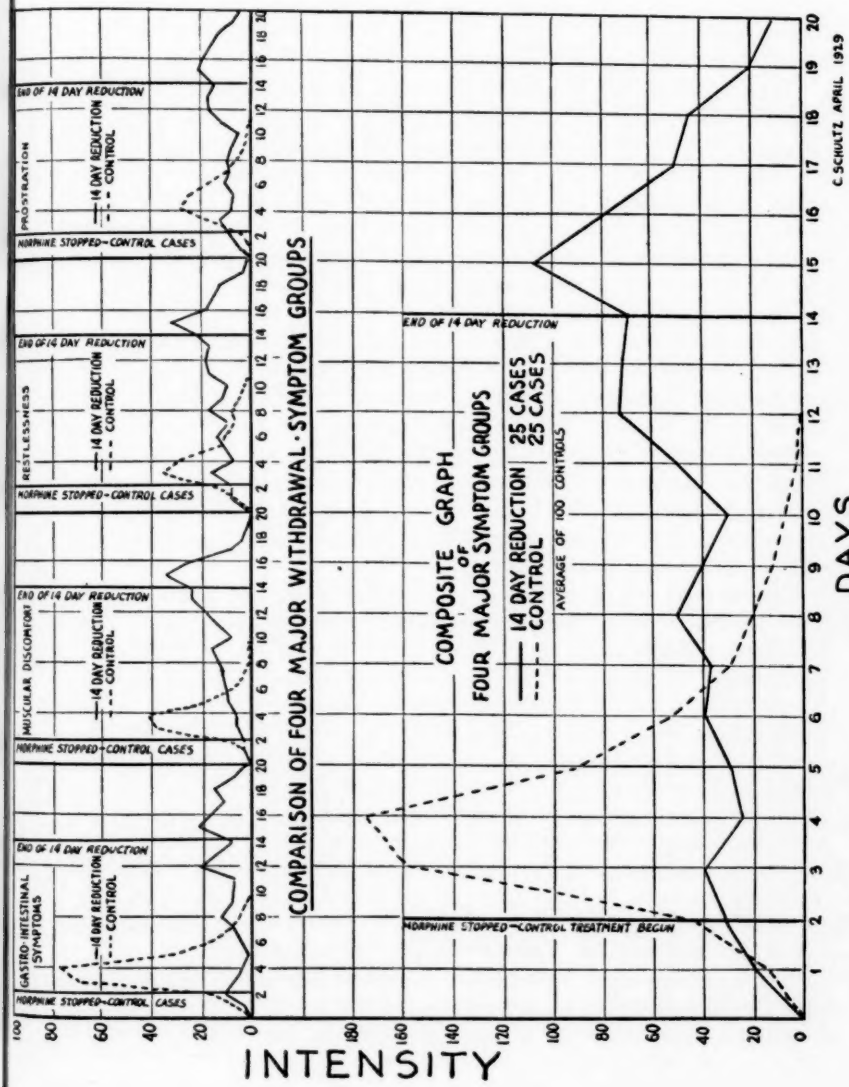
Codeine phosphate	2 grains
Distilled water	to minims 10

The preliminary treatment and general management was the same as described for seven day reduction with the exception that in the Rapid Reduction with Codeine treatment the patients' balance ration of morphine was reduced one-half daily so that in four days time all morphine was completely withdrawn.

Codeine was given in 5 grain doses every eight hours alternating with the morphine injections which were also given every eight hours at alternate four hour periods. Thus a morphine injection alternated every four hours with an injection of codeine. While the morphine dosage was being reduced one-half daily, the injections of codeine were maintained at a 5 grain dose level until all morphine was withdrawn and on the fifth day the codeine was then given every four hours in 5 grain doses. On the sixth day the codeine was given every four hours in 3 grain doses. On the seventh day of treatment the codeine was given in 1 grain doses every four hours, and on the eighth day saline minims XXX was given every four hours and continued until all withdrawal symptoms were over.

As in the 7 and 14 day series all the hypodermics were made up to minims XXX, with normal saline.

Of the 25 patients who received the Rapid Reduction with Codeine treatment: 22 patients or 88% were comfortable before reduction on a daily dosage of 3 grains of morphine; 3 patients or 12% were comfortable on a daily dosage of 4 grains.



COMPARATIVE GRAPH OF THE 14 DAY REDUCTION AND THE CONTROL TREATMENT.

General Results.—Of the 25 patients receiving the Rapid Reduction with Codeine treatment, two patients or 8% had severe withdrawal symptoms, compared to 30% of the controls; 6 patients or 24% had moderate withdrawal symptoms, compared to 33% of the controls, and 17 patients or 68% had light withdrawal symptoms, compared to 37% of the controls.

Thus we found that in general the Rapid Reduction with Codeine treatment ameliorated the withdrawal symptoms more than the control and seven day reduction treatments, but not quite as well as the 14 day treatment.

Detailed Results.—Taking the four major symptom groups again as a basis we found that the gastro-intestinal symptoms in the Rapid Reduction with Codeine treatment were much lighter than in the control treatment, a little better than the seven day reduction treatment, but not quite as satisfactory as in the 14 day reduction treatment.

Sixteen patients or 64% suffered from moderate vomiting, compared to 82% of the controls; 2 patients or 8% evidenced a slight diarrhea, compared to 41% of the controls who showed this symptom.

The comment on diarrhea in the 7 and 14 day reduction treatment applies equally to the Rapid Reduction with Codeine treatment.

The muscular discomfort, restlessness, and prostration were less than in the control cases, with the same general comment as given under the 7 and 14 day reductions.

Sixteen patients or 64% complained of muscular twitching, compared to 88% of the controls.

Thus in every one of the four major symptom groups the Rapid Reduction with Codeine treatment was a great improvement over the control method of abrupt withdrawal.

None of the patients in the Rapid Reduction with Codeine treatment showed any delirium or impairment of vision, but a few complained of headache, itching of the skin or mild urticaria, as a result of the codeine injections, which agrees with Dr. Lambert's reported findings of a similar nature [18] that, "Some patients cannot tolerate codeine and break out into an urticarial rash or a fine red punctate rash or swelling and burning of the skin."

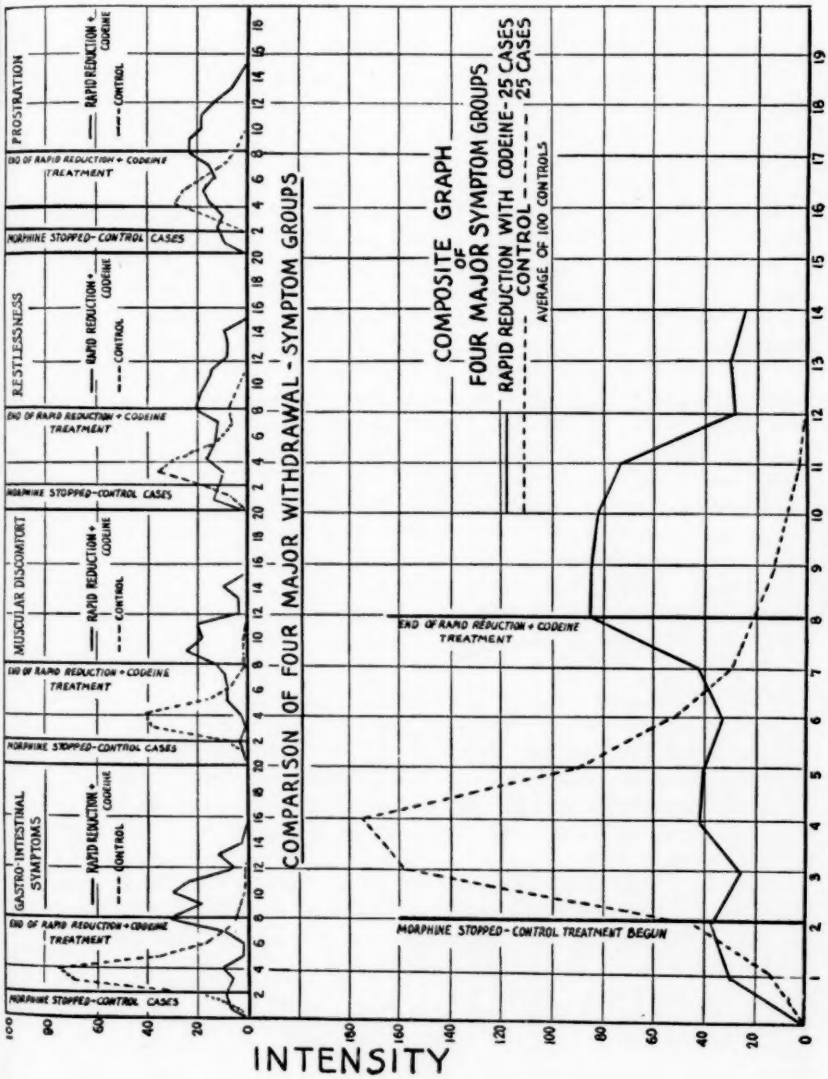
Convalescence.—The statement on convalescence under 7 and 14 day reduction treatments applies in every way to the Rapid Reduction with Codeine treatment.

Summary.—In general the summary given for the seven day reduction series also applies to the Rapid Reduction with Codeine treatment.

The Rapid Reduction with Codeine treatment was better than the seven day reduction treatment but not quite as satisfactory as the 14 day reduction treatment, when the number of severe withdrawals, and relative intensity of the gastro-intestinal symptoms are compared.

The main withdrawal symptoms in the Rapid Reduction with Codeine treatment occurred when all the codeine was withdrawn.

Some patients showed a mild idosyncrasy or slight anaphylactic reaction to injections of codeine.



COMPARATIVE GRAPH OF THE RAPID REDUCTION WITH CODEINE AND CONTROL TREATMENTS.

General Summary of the Reduction Treatments.—(1) Whereas in all the abrupt withdrawal treatments the patients undergo the full intensity of all the withdrawal symptoms, which suffering involves a danger of collapse and imposes a severe strain on the physical resources of the addicts, we found that every reduction treatment studied diminished the degree of the suffering and decreased the strain upon the patients. (2) The severe and distressing gastro-intestinal symptoms observed during the abrupt withdrawal treatments were lessened considerably in the seven day reduction and the rapid reduction with codeine treatment; in the 14 day reduction very few of the patients showed this symptom to any degree. (3) The number of severe withdrawal reactions was noticeably decreased in the reduction treatments being least in the 14 day reduction treatment. (4) The reduction method of withdrawing the narcotics was found to be the simplest and most satisfactory means of unpoisoning the patients.

Psychological Reactions to Reduction Treatments.—In a reduction treatment the period of suffering and medical care is prolonged for a greater or lesser period, and the handling of these cases is sometimes made more troublesome to all concerned, as their disagreeable conduct during the period of withdrawal is prolonged. If not surly, as long as they are getting enough morphine to control their symptoms they may be unusually boisterous.

The patients realize they are getting narcotics which relieve them, and as a result instead of wanting to be taken off treatment ("off-shots") as quickly as possible, which is the case in the abrupt withdrawal treatments, many of them ask for more injections. Some try to obtain additional hypodermics by saying they "missed their last shot." Others ask to be kept "on shots" longer, some in fact asking to be kept on as long as they were detained on the ward, with the intentions presumably, of continuing their own "shots" after discharge.

Each injection subconsciously impresses on their minds that they need the narcotic to control their symptoms.

It is interesting to note that many of the patients do not complain that they are suffering from withdrawal symptoms, instead they declare that they "don't feel the shots," showing that they are still looking for the thrill of their narcotics, and giving an inkling as to how seriously they want to get off their drugs.

When they reach the end of the reduction, with complete withdrawal, there is not the same reaction of euphoria as after abrupt withdrawal, for several reasons. First, they are never really sure that they are off their narcotics, and are always suspicious that they are getting less than they should anyway, and in fact, they are always in a paranoid, suspicious state thinking they are not getting a square deal. They believe they are being fooled by sterile hypodermics and resent this idea because they often think that they can detect when no more narcotics are being given to them, although actually often they do not. When they are still getting opiates they sometimes believe they are getting sterile water (they call it "aqua," or "Swanee River," or "onion juice") and *vice versa* they often think they are getting morphine when plain saline is given to them.

In addition, there is no feeling that they are receiving a mysterious, well-advertised treatment, which has been claimed will "cure" them or "obliterate the craving for narcotics."

They realize that they are receiving a type of treatment which they believe they could carry out themselves, much better than the way it is given in a hospital, and, in fact, they often do try to reduce themselves at home.

There is no feeling of sudden relief from intense suffering as in the abrupt withdrawal treatment, on the contrary, they feel that an injustice is being done to them when they are taken "off shots" as opposed to the feeling of relief and gratitude when taken off abrupt withdrawal treatment. They resent being taken off treatment and psychologically this suspicious resentful frame of mind and the suggestion which is impressed on them by each injection that the narcotics are essential to relieve their symptoms, is not one conducive to the patients abstaining from narcotics when discharged.

Consequently instead of a euphoria there is instead very often an irritable, dissatisfied mental state after the reduction, with feelings of inadequacy and desire for narcotics (which, however, we believe is present regardless of the treatment but which is more openly expressed after a reduction). As we have mentioned during abrupt withdrawal, irritability is present also, to a greater degree of intensity, but for a relatively shorter period of time.

To show how the pyschic factor alters the reaction to treatment we observed that several of the patients receiving a 14 day reduction treatment were under the impression that it was a seven day treatment, and after seven days thinking they were receiving sterile hypos they began to show considerable restlessness and one patient even simulated a convulsive seizure and behaved in a very ugly and irritable manner. When told they were still receiving morphine all these symptoms disappeared.

In reduction treatments the patients often tend to prolong or exaggerate their symptoms in order to get more injections, *i. e.*, there is no incentive to a quick recovery.

We have found it inadvisable to give saline hypodermics for more than a few days after all withdrawal symptoms were over, as the patients often vainly hope there is some morphine in the solution; they plead for more and are dissatisfied because they get no "kick" out of it. There is some psychic value in telling the patient that he is "off shots" as soon as possible, in order to encourage him to make an effort to get along without them.

That it is a mistake to keep patients who are off treatment in the same ward with others who are still receiving injections was frequently confirmed by the look of envy some of the patients who were "off shots" showed when these other patients received their hypodermics.

Summary.—Treatment may be judged along two lines—one, that of controlling the sufferings which follow the withdrawal of narcotics, and incidentally of avoiding exhaustion, collapse, or death; and secondly, that of leaving a good psychological impression on the patient's mind in order to help him abstain from drugs.

From our observations the reduction treatments are much superior when judged along the first line; abrupt withdrawal treatments appear to leave

the patient in a better frame of mind, but we believe that consideration for the patient's comfort and life to be the more important of the two.

Non-Specific Treatments.—We shall now describe the results obtained by certain symptomatic treatments which were tried out from time to time in all the withdrawal methods, usually in conjunction with these treatments, but in several instances they were used on a small number of patients as a definite separate experimental series.

In treating morphinism the first and natural tendency is to try to obtain a drug which will replace opium, give a satisfactory sedative effect, and be non-habit-forming.

One naturally, therefore, turns to the group of hypnotics and nervous depressants. The most common of these were tried out on many of the patients at various stages of treatment and withdrawal with varying results.

In general, our results with the non-narcotic hypnotics and nervous depressants were not encouraging, or of such a nature as to lead one to believe that any of them influence the treatment of opium withdrawal to any appreciable degree.

In explaining our results we wish to point out certain factors:

1. Many addicts show during addiction a tolerance for hypnotics as well as for narcotics, and can take huge amounts of hypnotics without evincing the usual signs of overdosage.

2. Most of the withdrawal symptoms appear to be specific to chronic opium poisoning, and opiates alone seem to possess the power of controlling or relieving these characteristic symptoms in all cases and also the power to avert the collapse which may result from the deprivation of their narcotics.

3. The mentality and suggestibility of drug addicts is an added factor because nearly all of them are imbued with the idea that opium alone can control their symptoms (which is in the main correct) and are often afraid or unwilling to use non-opiates as a substitution treatment.

Criteria.—The only real test of the efficacy of hypnotics or non-narcotics in general is that of abrupt withdrawal of narcotics with the substitution of the hypnotic in question in full amounts.

In a properly given reduction treatment, the hypnotics are unnecessary, in most cases.

General Results.—Whereas in some few cases the patients appeared to have been made fairly comfortable by doses of hypnotic drugs, yet as Park[15] pointed out there are some addicts who may undergo an abrupt withdrawal with little, if any, discomfort.

In the majority of cases we found the hypnotics to be useless except occasionally as a placebo. In many instances the patients were actually made more uncomfortable, excited, delirious, or thrown into a dull, intoxicated, ugly, restless, irritable and disagreeable condition and almost impossible to control.

These results usually followed where the patient was given large doses of hypnotics before the opiates had been completely withdrawn, and where withdrawal symptoms were still in evidence

Once the withdrawal period is over, and the main symptoms have abated, we found them to react to the hypnotics in the same manner that non-addicts respond. In addition, we found one group of hypnotics to be as effective as another, generally speaking.

Magnesium Sulphate Therapy.[46]—As magnesium sulphate has been reported as being synergistic with morphine and an aid to anesthesia, this drug was tried out on 48 of our patients during the course of various treatments. It was given by intramuscular injection in the amounts recommended by Gwathmey, *viz.*, 2 c. c. of a 50% solution repeated at frequent intervals, in some cases every four hours, sometimes in combination with morphine and at other times, alone.

Results.—We failed to observe any synergistic action with morphine. In a few cases the patients were quieted by the injection, but in these instances we believe the results to have been psychic, as many of our patients were likewise quieted by sterile hypodermics.

The majority of the patients were not relieved by the injections of magnesium sulphate, but, on the contrary, complained severely of the burning and irritation of these injections, even worse than that of "narcosan," and possibly incidental to the hyperesthesia previously mentioned and in some instances this irritation persisted for from one-half to one hour or longer.

As a result these patients refused further injections and the treatment was not used again for some time. The correctness of our observations was confirmed by further experimentation in which the clinical and chemical results were coordinated.

At the suggestion of Dr. G. B. Wallace who, with Dr. I. Neuwirth, had been observing the results of magnesium sulphate when given to animals in large amounts, it was decided to try the drug again in the doses they had found effective in their work.

The magnesium sulphate experimentation was carried out under the direct supervision of Dr. Wallace. 50% solution of magnesium sulphate with 0.1% novocaine was the form in which the drug was given. The amount of the initial injection varied from 10 c. c. to 32.8 c. c. given in different areas, the major portion deep into the gluteal muscles and the remainder in the shoulder muscles.

At first only a single injection was given a short time (usually four hours) after the last injection of morphine. Later the treatment was given after 24 hours of withdrawal in order to determine the effects when given at a period of actual discomfort.

In the last few patients the initial injection was followed by smaller injections of 5 to 10 c. c. at four hour intervals in order to obtain, if possible, a sustained depressant effect.

In one patient the effect of giving magnesium chloride in large amounts by mouth was tried out, as it has been claimed by some workers that this drug is absorbed from the stomach with results comparable to those induced by subcutaneous injections of magnesium salts. Forty grains of magnesium chloride were given by mouth in solution every two hours after all morphine was abruptly discontinued.

Eight patients in all received the magnesium sulphate treatment in the large quantities recommended by Drs. Wallace and Neuwirth.

Blood specimens were taken from the patients at different intervals after the injections; in some an hour after, in others, two hours after, in others four hours after, and in others 12 hours after. In addition in each case a control specimen of blood was taken before the magnesium sulphate was given. On the average four specimens of blood were taken from each patient at varying periods after the injections.

The blood analyses were done by Dr. Neuwirth who made calcium and magnesium determinations in order to estimate the blood changes especially the rise and the period of maximum concentration of blood magnesium, and the rapidity of its disappearance from the blood, *i. e.*, the rate of excretion.

Results.—The figures for blood calcium were found to be normal before and after magnesium sulphate treatment (9.8 to 11 mgm. per 100 c. c. blood serum).

The clinical results obtained by the use of magnesium sulphate corresponded very closely with the chemical findings of magnesium concentration in the blood serum.

It was found that in order to obtain a sedative effect from the injections 0.25 gram magnesium sulphate per kilogram of body weight was the minimal effective dose. This dose brings the serum concentration of magnesium from the average normal of about 2 mgm. to 5-6 mgm. per cent, at which level it may be maintained for four to five hours. During this time mild depression is present as evidenced by relaxation and absence of restlessness.

Where the amount injected was less than 0.25 gram per kilo. there was only a slight increase of blood magnesium with slight if any clinical results.

Further, once the initial injection of 0.25 gram per kilo. had increased the blood magnesium content to a sufficiently high figure, it was found that smaller injections of 10 c. c. were able to keep the blood magnesium up although the figure dropped very rapidly.

The magnesium chloride given by mouth was entirely ineffective both in regard to relieving withdrawal symptoms and also failed to raise the blood magnesium concentration.

Detailed Results.—After each injection the patients usually remarked that they felt warm, the skin became moist, and the pulse rate was increased slightly in a few cases.

Where a sufficient quantity was injected (0.25 gm. per kilo. of body weight) there soon followed a relaxation and lessening of restlessness and muscular twitching. In a few cases a short period of sleep followed.

Smaller amounts than 0.25 gm. per kilo. were usually ineffective in producing sedation.

The period of relief, however, even where full amounts were given, was short, usually not over four hours. The period of relaxation corresponded closely to the chemical findings of increased magnesium concentration in the blood which reached its maximum from the second to the fourth hour after the injection.

After this short period all the withdrawal symptoms recurred; there was no diminution in the duration or the severity of these symptoms. Restlessness, twitching, and vomiting were again apparent.

In some cases thirst was complained of. In most cases some weakness was noticeable for several days after the magnesium therapy.

In addition, all the patients complained of pain at the site of the injections which persisted for about a day, in spite of massage after each injection.

No polyuria was observed nor hyaline casts seen in the specimens of urine examined."

In the patient to whom magnesium chloride was given by mouth no sedation whatsoever was observed. Instead, the frequent doses hastened the onset of nausea, vomiting, abdominal cramps and diarrhea. Finally the patient refused further medication.

As a result of the lack of relief given by the injections of magnesium sulphate and the irritation of these injections, the patients took these treatments unwillingly and the series was discontinued.

Summary.—(1) In treating drug addicts, no synergism was observed when magnesium sulphate solution was given by injection combined with morphine. If anything, the irritation of the magnesium sulphate counteracted the quieting effects of the morphine. (2) Magnesium sulphate failed to produce sedation when given in amounts less than 0.25 gm. per kilo. body weight. (3) Where magnesium sulphate was given in full amounts the sedative effect lasted a comparatively short and unimportant length of time; the duration and severity of the withdrawal symptoms remained uninfluenced by the injections of magnesium sulphate. (4) The irritation of the injections of magnesium sulphate counteracted the slight sedative qualities. (5) No advantage was observed in the treatment of narcotic addiction by the use of magnesium sulphate by injection, or magnesium chloride by mouth.

Experimentation with Sodium Iso-Amylethyl Barbiturate.[48] (*Sodium Amytal*).—This drug is one of the newer and most powerful of the barbituric acid group of analgesics, having also anesthetic qualities.

The drug was generously supplied in ampoules as anhydrous sodium salt of iso-amylethyl barbituric acid (sodium amytal) by Eli Lilly and Company.

The treatment was given to 12 patients. In the first series of three cases one patient was given the drug intravenously, another intramuscularly into the gluteal muscles, and the third by mouth. In the remaining nine patients the drug was given orally.

In general the drug was given after all morphine was abruptly discontinued. In one case the effect of a single dose was tried after a reduction treatment when all withdrawal symptoms were over, and in several cases small doses of morphine and codeine were given to obtain, if possible, better results. The effects of various amounts of the drug were compared to determine the minimal effective dose in treating drug addicts.

From the results obtained in the first three patients it was found that the same effect could be obtained whether the drug was given intramuscularly, intravenously, or by mouth. In consequence in the majority of the cases, for

the sake of simplicity the drug was given by intramuscular injection into the gluteal muscles. In a few cases the initial doses were given by mouth.

In the first three cases, the initial dosage was as follows:

Case 1, intravenous injection, 22½ grains; Case 2, intramuscular injection, 25 grains; Case 3, oral administration, 15 grains.

The results of these large doses were quickly apparent. In from 5 to 15 minutes, the patients were sound asleep, almost to the degree of surgical anesthesia, relaxed and perspiring, with a lowered systolic blood pressure.

Results.—In general it was found that sodium amytal given in sufficiently large doses, whether intravenously, intramuscularly, or by mouth, induced at first a deep state of torpor, in which the patients were mostly relaxed, but in some cases muscle tone and resistance was present.

Here it may be noted that in the original article[48] it stated, "The lethal dose of sodium iso-amylethyl barbiturate for man is unknown; consequently, we have set 25 milligrams per kilogram of body weight (up to a total amount of 25 grains) as the maximum dose to be given intravenously for the production of anesthesia."

Whereas only one patient received the treatment intravenously, the total amount of the drug given to our patients over the course of a few days ranged from 5 to 67½ grains with an average total dosage of 38 grains. It was found that five grains was the minimal effective dose in treating drug addicts, also that doses of from 7½ to 15 grains given by mouth as the initial doses were often sufficient to induce a state of sleep or unconsciousness in the majority of the patients. Morphine or codeine given with the amytal did not improve the results obtained.

However, the period of relaxation and relief from consciousness and suffering in the majority of cases only lasted for a comparatively short time. This applied also to those patients who received amounts ranging on 25 grains. After four to six hours of calm, the patients roused, became restless and even where doses of 10 grains were repeated intramuscularly every half hour or every hour or at frequent intervals the state of restlessness was not abated.

Of the twelve patients who received amytal, seven showed some delirium and of these six were disturbed and required restraint; four complained of headache.

In only two cases were the results satisfactory, one of which was an abrupt withdrawal in a young patient whose addiction was of short duration; the other patient was free from withdrawal symptoms as he had completed a reduction treatment and this patient was given a single dose of amytal to obtain a night's sleep.

These two patients slept well and showed no ill effects, although the first one still had some of the usual withdrawal symptoms.

Three patients showed marked weakness while under the amytal treatment.

One patient gave no results favorable or unfavorable, and in one case the results were negligible. Where the results were nil or very slight only a very small amount of the drug was given.

Seven of the 12 patients showed considerable irritability both during and after treatment. It was also found that where the patients became disturbed under the use of amytal further doses accentuated this restlessness, rather than diminished it. In addition during this state of excitement doses of morphine sufficient usually to quiet other patients failed to do so in the amytal cases.

The disturbed cases thrashed about in a state of motor restlessness and mental confusion and delirium. The typical symptoms of barbituric acid intoxication were apparent in the ugly, irritable frame of mind of the patients, the staggering gait, and slurring and ataxic speech, and mental haziness.

In a few cases marked psychomotor excitement manifested itself. More physical restraint was necessary in the amytal treatment than all the other treatments combined (12 patients received amytal treatment compared to 306 patients receiving other treatments).

Although the majority of the cases receiving amytal spent part of their withdrawal period in a state of unconsciousness, the effect of the amytal on the usual withdrawal symptoms was negligible. The patients, in addition to undergoing the delirious restlessness incidental to the barbituric intoxication, suffered also all the characteristic gastro-intestinal withdrawal symptoms and muscular aches and twitchings which followed upon the withdrawal of their narcotics, and which were unaffected both in degree and duration.

Furthermore, there were definitely increased subjective and objective signs of prostration, the patients complained of marked weakness; their appetites were poor and they were generally in a dissatisfied, irritable state.

In a few cases, diuresis with retention, or dysuria was noted. It was also noted that patients suffering from pulmonary conditions, such as bronchitis, bronchiectasis, emphysema, pulmonary tuberculosis, etc., reacted to amytal as similar cases respond to ether anesthesia, *viz.*, with an increase of bronchial secretion impeding respiration and producing cyanosis. In these cases injections of atropine eased the respiratory distress.

Two patients showed marked prostration approaching collapse, when stimulation in the form of morphine and caffeine sodium benzoate combined with ephedrine or adrenaline had to be given. Here it may be noted that there is a danger of the patient swallowing the tongue when deeply somnolent under amytal treatment, and this condition was closely watched for and threatened in only one case.

Recuperation was slightly delayed after amytal.

Summary.—(1) Sodium-iso-amylethyl barbiturate failed to alleviate the withdrawal symptoms in narcotic addiction. (2) While powerful enough to induce a short period of unconsciousness in most cases when given in sufficient doses the majority of the patients became delirious, and disturbed upon further dosage. (3) Irritability is increased and prolonged by the use of sodium amytal, the care of the patients made very difficult, and restraint often necessary. (4) Prostration was increased by sodium amytal treatment. (5) Some patients showed adverse pulmonary or urinary symptoms following

sodium amytal treatment; the increased perspiration and relaxation following its use exposes the patient to the same danger of pneumonia as other forms of anesthesia. (6) Recuperation is somewhat delayed after sodium amytal treatment. (7) Except if given as an occasional single large dose at a period of discomfort, sodium amytal has not shown itself to be of value in the treatment of narcotic withdrawal, and we believe this same generalization applies also to magnesium sulphate.

In general the results obtained from all the other hypnotics closely paralleled those of sodium amytal. Small doses as a rule were ineffective under the conditions of abrupt withdrawal. Larger doses produce an intoxicated, ugly and unreasonable mental state often associated with insomnia rather than aiding sleep.

In a few cases apparently good results were likewise obtained by a placebo, *e. g.*, a capsule of sodium bicarbonate.

At this point we may also mention that the analgesics and antipyretics were also ineffective in most cases before complete withdrawal of the narcotics was effected, agreeing with Dr. Lambert in his article on "narcosan."

After all the withdrawal symptoms were over, the hypnotics, analgesics and antipyretics then gave the usual results obtained in non-addicts, *viz.*, sleep or relief of pain, and as we have mentioned one group gave much the same results as the others.

Allyl Iso-Propyl Barbituric Acid.—The chemical firm of F. Hoffman-La Roche & Co. prepared and furnished ampoules containing a solution of the active principle of allonal, eliminating the amidopyrene radical.

These ampoules contained 2 c. c. of solution in which was dissolved 3 grains of allyl iso-propyl barbituric acid.

Sixteen patients received injections of this drug at four or eight hour intervals, during abrupt withdrawal treatments. The average number of injections was three, several patients received five.

The results simulated those of injections of hyoscine. After the third injection many of the patients showed a mild delirium; the withdrawal symptoms were unaffected.

Allonal.[9]—Allonal is a loose combination of amidopyrene with allyl iso-propyl barbiturate.

Thirty-one patients received doses of allonal ranging from 2½ grains to about 10 grains and repeated at varying intervals.

No results of any importance were obtained, the general summary of hypnotics given above applying here also.

Elixir allurate, another preparation containing 1 grain of allyl iso-propyl barbituric acid to one drachm of the solution was given to nine patients, in two drachm doses, with similar indifferent results.

Neo-Paraldehyde (*Revenin*).—The committee received from the Ostro Products Corporation a supply of revenin which is neo-paraldehyde in powder form. The doses recommended were 4 grams (60 grains) to 6 grams (90 grains) given, as it is readily soluble, in 30 c. c. of water or in whiskey or alcohol.

Seven patients received this treatment in the doses and different vehicles recommended.

The only results were gastric irritation, with abdominal cramps and severe vomiting in nearly all cases lasting for several hours.

Bromides and Chloral.—These drugs were usually given together.

Two hundred and thirty-four patients received this combination at various times. In the majority of the cases the B. & C. mixture was given chiefly as a placebo.

The dose of bromides, usually sodium bromide, ranged from 10 to 40 grains given in 14 cases at least, every eight hours. The dose of chloral ranged from 7½ to 15 grains.

Here also overdosage produced a drunken, unmanageable condition. Frequently repeated doses of bromides caused gastric irritation with vomiting.

Some patients received doses of B. & C. and surreptitiously gave them to one of their number who might be suffering severely, in the ignorant belief that large doses might relieve him with the result that the recipient developed a peculiar state of intoxication which we finally diagnosed as drug intoxication, after the facts were discovered.

These fortuitous occurrences proved to be an aid in estimating the effects of many sedative compounds which were given a trial during the course of our study.

Sodium-Luminal.—A supply of anhydrous sodium-luminal in ampoules was obtained. The drug was given to 11 patients undergoing abrupt withdrawal treatments, at two, four, or eight hour intervals. Freshly prepared solutions were made and the dosage was 1 to 2 grains.

The injections failed to alleviate the withdrawal symptoms or to induce sleep or comfort. On the contrary, frequently repeated injections served only to increase the excitation and the patients who received frequent doses became just as unmanageable as the amytal cases.

Alcohol.—The effects of alcohol on drug addicts undergoing abrupt withdrawal was observed. The alcohol was given by mouth in the form of 50% solution of ethyl-alcohol diluted in water, or whiskey in ½ to 1 ounce doses.

Whiskey was given to 23 patients; alcohol to seven.

At this point it may be mentioned that during withdrawal, most of the patients are somewhat nauseated, and for this reason mouth medication is often not retained. As was aptly said the patients are, "on the ragged edge of puking."

Any medication which is unpleasant in taste, or for which the addict may have an antipathy, or which is irritating, will be promptly vomited.

This usually happened where the alcohol was given, sometimes also with the whiskey; but where the whiskey was retained, we often noted a slight relief, and some soothing, or stimulating effect on the patient.

Paraldehyde.—Paraldehyde in two drachm doses was given to 15 patients, usually at night. The statement on mouth medication given in the preceding paragraph on alcohol applies to paraldehyde.

Many of the patients will refuse this drug on account of its taste, others will take one dose and refuse the second, still others will ask for more and the danger of paraldehyde addiction must be borne in mind.

Several patients vomited this drug promptly; where it was retained, in some cases sleep followed without ill effects. However, the unpleasant taste and odor, the vomiting in some cases, and the antipathy of some and the danger of addiction in other patients, led us to restrict the number of patients who were given this medication.

Luminol.[50, 51]—Luminol (Phenobarbital or Phenylethyl barbituric acid) was given to 173 patients often combined with bromides and chloral, in doses of ½ to 3 grains.

The results were identical with the other barbituric acid derivatives.

Veronal.—Veronal (Barbital or Diethyl barbituric acid) was given to 18 patients in from 5 to 10 grain doses with similar results.

Trional.[52]—Trional (sulphonethylmethane) was given to 35 patients in doses of 5 to 20 grains with the usual slight results of the other depressants.

Pyramidon.—Pyramidon (di-ethyl amino-antipyrene) was given to 18 patients in doses of 5-10 grains, with indifferent results unless as a placebo.

Aspirin.—Aspirin (acetylsalicylic acid) was given to 12 patients in 5-10 grain doses, usually as a placebo.

A combination of Phenacetin, acetanilid and caffeine citrate having the following formula:

Phenacetin	5	grains
Acetanilid	3	"
Caffeine Citrate	2	"

(one capsule)

This combination was given to 25 patients in doses of one to two capsules, for the relief of minor pains or headaches. The results were questionable apart from that of a placebo.

Psychotherapy.[53]—As we have mentioned, as a class drug addicts are very suggestible, and many of their real or imaginary symptoms are often relieved by suggestion properly applied.

Sterile hypodermics containing saline or plain water were given to 25 patients at various times with frequent quieting effect.

In addition placebos of various kinds as mentioned above, or of capsules containing innocuous ingredients, *e. g.*, sodium bicarbonate, often relieved some of their mental symptoms, or induced sleep.

Other Forms of Treatment.

Cathartics.[54]—Whereas drastic catharsis has been recommended in nearly all of the various treatments for drug addiction, we have failed to see any advantage to be derived from purging the patient to the point of obtaining a mucous colitis, as there is sufficient of a tax of their physical resources, by the withdrawal symptoms *per se*, without adding to the prostration by excessive purging.

Drug addicts in common with even normal people often show an individual idiosyncrasy to cathartics, either real or imaginary.

Some patients claimed their bowels did not move, even with several compound cathartic pills; others would vomit Epsom salts or castor oil, and still others would develop a diarrhea with very mild catharsis.

In our controls we found that moderate catharsis gave the best results. In general, the combination of 2 compound cathartic pills on admission followed by a dose of Epsom salts on the next morning resulted in a sufficiently satisfactory catharsis.

We found that drastic purgation precipitated severe gastro-intestinal symptoms to which they are naturally predisposed during morphine withdrawal, and as a result increased the prostration: 145 patients received at various times (usually on admission) doses of two compound cathartic pills; 221 patients received doses of saturated solution of Epsom salts in one to one and one-half ounce amounts; 61 patients received castor oil in one-half to one ounce doses on admission; 2 patients received a calomel series, as described on page 44.

In addition, at various times, some patients were given milk of magnesia, rhubarb and soda, mineral oil, or fluid extract of cascara.

Occasionally enemata or high colonic irrigations were used. Compound enemata were often given on admission, both to clear the lower bowel and remove possible caches of narcotics.

Potassium Permanganate.—As a result of the general impression that opiates are excreted into the stomach, and that the gastro-intestinal symptoms may be partly due to this fact, at the suggestion of Dr. Lambert six patients received dilute solutions of potassium permanganate by mouth at four hour intervals.

The only effect was increased nausea as a result of taste of this medication, with a final refusal of further dosage and discontinuance of this form of treatment.

Alkalies.—As mentioned previously sodium bicarbonate in 30 grain doses every four hours are often beneficial to patients undergoing abrupt withdrawal treatments, as the marked gastro-intestinal symptoms incidental to these methods of withdrawal and the semi-starvation often produce a condition resembling acidosis with acetonuria and the alkali also reduces the subjective sensations of "heartburn" and abdominal cramps.

We found sodium bicarbonate to be superior to magnesium oxide for the relief of the gastric symptoms.

Two hundred and twenty-three patients received doses of sodium bicarbonate in 10 to 40 grain amounts at frequent intervals.

Thirty-eight patients received doses of magnesium oxide in 5 to 30 grain amounts at similar intervals.

Astringents.—For excessive diarrhea or severe gastro-intestinal symptoms bismuth subcarbonate was often given.

Fifty-two patients received this drug, sometimes combined with sodium bicarbonate in 10 to 30 grain doses.

In the reduction treatments, less alkalies were necessary, less bismuth and more cathartics.

Stimulants.—In treating drug addicts, morphine is the best stimulant in cases of collapse and will give good results in all cases, unless the patient is moribund from some other condition than the withdrawal of his narcotics.

Injections of adrenalin in 5-15 minim doses will often improve the condition of the pulse, although some patients complain of cardiac palpitation after an injection of adrenalin.

Eighty-two patients received injections of adrenalin at various times, occasionally as a cardiac stimulant, sometimes as an effective placebo, and in a few instances to observe the effects on abdominal cramps (as suggested by Dr. Wallace) in respect to which some patients admitted relief; others did not.

Whiskey in one-half to one ounce doses as an adjuvant to morphine in cases of collapse is also helpful.

Injections of caffeine sodium benzoate, strychnine, digitalis preparations or iron quinine and strychnine by mouth gave little if any appreciable results.

Six patients received injections of digalen or digifolin for cardiac stimulation with questionable results.

Parathyroid.—Parathyroid extract in one-tenth grain doses by mouth three times daily was given to three patients without effect.

In addition four patients received calcium lactate in fifteen grain doses every four hours without any diminution of neuromuscular irritability.

Physiotherapy.

Massage.—When suffering severely from muscular aches and twitchings, the patients were often relieved by a brisk massage or alcohol rub.

Often the patients massaged each other, "to take the kinks" out of their muscles.

Here it may be noted that when they have no access to narcotics, drug addicts will try almost anything they believe may have some narcotic effect.

For this reason, if permitted to have some chloroform liniment to massage another patient, some drug addicts will drink the contents of the bottle and be rewarded by violent abdominal cramps for their folly.

Others will inhale the solution to get the effect of chloroform, and still others will spill the contents over their pillow and lie down, hoping to inhale sufficient of the chloroform to get a period of sleep.

Heat.—Hot showers often relieved the patients when very restless and soothed excessive muscular aches and twitchings, and sometimes induced a period of comparative comfort and sleep.

Here we would like to add another note to their behavior. Several patients undergoing a reduction treatment refused to take a hot shower for fear that the ensuing perspiration might cause a loss of some of their morphine.

Diet.

Feeding these patients was always a problem, because after all the withdrawal symptoms were over (this regardless of the type of treatment), the patients were half-starved, ravenous, always hungry, ate about six times daily and could never be satisfied ("chuck horrors").

As a result they gained in weight and strength rapidly, and incidentally the consumption of food worried the dietetics department considerably.

(We would also like to mention that many of the patients were as fickle in their wants and whims and tastes for food as some pregnant women.)

Thanks to the generous and spontaneous offer (which was accepted) of the Commissioner of Correction, Mr. Patterson, additional food supplies including fruit were obtained for the patients with the cooperation of the Commissary of the Department of Correction, thus making the patients more tractable and easing the difficulties of those handling them.

As many drug addicts during withdrawal treatment develop, among other whims, a craving for sweets, at the suggestion of Dr. Lambert a supply of hard candy was obtained for some of them through the kindness of the Department of Correction.

This supplied a caloric value in concentrated form which we believe was an aid to conserving their strength.

Other Symptomatic Treatment.

When there was excessive vomiting, in addition to the sodium bicarbonate or bismuth subcarbonate therapy, some relief was often obtained by giving the patients cracked ice to suck or cold milk to drink, soothing the gastric mucosa and likewise furnishing some fluids.

We found that restricting food and fluid intake at periods of excessive nausea and vomiting was beneficial.

Where other fluids or foods were rejected, the patients often retained fruit juices (of oranges or lemons) as Dr. Lambert mentioned in his article on "narcosan."

In addition we found that carbonated water or seltzer to be more palatable and better retained by dehydrated, nauseated patients than plain water.

An ice bag to the stomach sometimes relieved abdominal cramps.

Sponges, followed by alcohol rubs, often made the patients more comfortable during periods of excessive perspiration.

Eggnoggs often with whiskey were helpful in building up cachectic patients.

Summary.

The most striking factor among the addicts here treated was that 87% were psychopathic personalities; only 13% were mentally of average stability.

The majority were relatively young, averaging 34 years of age, with 29% below 30 years of age.

The majority were heroin addicts giving environment as the cause of their addiction. In 7% illness was claimed to be the justification for their addiction.

The majority were recidivists having averaged previously 4 "cures."

No specific changes of body tissues attributable to their narcotic addiction could be found.

DANGERS OF MASS TREATMENT.

There is a strong bond of sympathy or clannishness between drug addicts and as a general rule they tend to "stick together" and show a certain *esprit de corps* with a more or less definite "code of honor" which applies to themselves only.

In other words, as long as they are all patients on the same ward, one addict may not "squeal" or betray another addict's misconduct, in fact so strong is this "law" that even a well-disposed patient is afraid to break this code.

However, any sort of trickery or chicanery is acceptable to them as far as those who are trying to treat them is concerned, and even if they disagree among themselves, they are all united when their dealings affect non-addicts, or those who are caring for them.

As a group, they are generally suggestible and this suggestibility affects their response to treatment in many cases. Let one dominating type of patient praise the treatment, no matter how unsatisfactory it may be, and most of the others will do likewise and give the same identical fallacious reasoning for their viewpoint.

Vice versa, a few noisy malicious, disgruntled or dissatisfied patients will affect the entire ward and make them all more or less unmanageable.

As a consequence to this suggestibility, they tend to become superstitious and quickly pick up peculiar ideas as to treatment, drug habits, etc., *e. g.,* many lie on the floor during withdrawal treatment in the belief that this is of some value when "breaking a habit."

This suggestibility must be taken into account when placing young non-criminal drug addicts in penal institutions, in company with the older incorrigible drug addicts and hardened non-addict criminals. It is easy to see where they will pick up criminal information as readily as they originally picked up drug habits.

Besides affecting their response to treatment, their suggestibility also bears some relation to their tendency to relapse.

Many drug addicts take a pride in their state of addiction which, in their viewpoint, elevates them from nonentities to people occupying a prominent place in public notice. In fact, they believe themselves superior to non-addicts.

They do not think their habit is a vice or that it degrades or injures them. To them it is a pleasure, which they see no reason for giving up, and as a result they are often amused at others' attempts to "reform" them.

If a patient of this type openly declares he is going to revert to drugs (and many do) and boasts about it, enlarging upon the pleasures of his first "shot" upon discharge, others are very apt to do likewise.

This attitude is detrimental to the exercise of self control and will power on the part of the more sincere patients, as sometimes they will ridicule such a patient's statement that he is going to try to stay off drugs, *e. g.*, one patient declared on discharge that he was "through with drugs." Another patient then told him "For ——— sake, be a man, get shot up."

In brief, as a result of their suggestibility, mass treatment cannot but be ineffective in the majority of cases, and an attempt to rehabilitate them "en masse" will likewise be ineffective.

All above is assuming that the treatment is being carried out under the best of circumstances, the personnel entirely honest and trustworthy, and no narcotics being smuggled in.

Considering that it is almost impossible to obtain such a perfect arrangement and realizing the extent to which the patients and drug vendors on the outside will go to cooperate in smuggling in of narcotics, and the financial aspect involved in the drug situation, the difficulties of rehabilitating or treating drug addicts "en masse" may well be realized. A supply of drugs smuggled into such an institution reduces the whole experiment to a farce.

Last, but not least, we are also assuming that all the legal machinery involved in carrying out the excellent anti-narcotic laws is running very efficiently.

RECOMMENDATIONS FOR TREATMENT.

Individual Reactions.—There is another angle which we have not stressed as yet, but which we believe has some importance.

In our general analyses of the various treatments we showed that while there were fewer severe withdrawal reactions in the more humane reduction treatments, some patients had marked symptoms in every form of withdrawal given.

To word it differently, some patients responded better than others in every treatment studied. That is, there appeared to be a definite individual factor influencing the degree of severity of the withdrawal symptoms in each case.

Some patients, as Park [15] mentioned, may go through an abrupt withdrawal with little or no suffering, others will do well on a seven day reduction, others on a fourteen, etc., and still others will be very sick even on a fourteen day or longer reduction treatment.

In consequence, the individual patient must be borne in mind, and in treating drug addicts a stereotyped, set method of treatment will not be satisfactory in every case, but must be shortened or lengthened to suit the responses and physical condition of the patient.

In practice we have always tried to carry this plan out in treating cases of drug addiction which come under our supervision in the psychopathic and prison wards at Bellevue Hospital, with good results.

We vary the rapidity of the reduction to suit the age and physical condition of the patient, and vary the amount of morphine and codeine given likewise.

Here we would like to point out that of the 318 patients in our series:

Two hundred and ten patients, or 63% approximately, were fairly comfortable before withdrawal treatment began, on a ration of 3 grains of morphine daily. 40 patients, or 13% approximately, required only 2 grains; 39, or 13% approximately, 4 grains; 13, 4% approximately, only 1½ grains; 9, 3% approximately, 6 grains; 5, 2% approximately, only 1 grain; 1, ⅓% approximately, 5 grains; 1, ⅓% approximately, showed no symptoms and was not given any morphine.

In brief, regardless of the amount of narcotics the patient claimed to have used daily on the outside, the majority can safely be put on a 3-grain ration daily, and according to their reaction the amount may be increased or decreased.

In general, unless as a placebo, we only use the hypnotics and analgesics when most of the withdrawal symptoms are over.

Recommendations.

1. That the patients be given as rapid a reduction treatment as the age and physical condition and response to the morphine dosage will warrant.

Younger addicts in good physical condition may often be given abrupt withdrawal without danger.

2. Aged or decrepit addicts, or those suffering from serious organic disabilities, should be kept on a sufficient morphine ration in properly supervised surroundings indefinitely, as there is danger to life in withdrawing their drugs.

3. It is inadvisable to prolong a reduction treatment so long that no withdrawal symptoms occur.

A certain amount of reaction exerts a wholesome psychological influence and deterrent effect in preventing too facile relapse from the fear of suffering which drug addicts have in the exaggerated form typical of their psychoneurotic make-up.

4. Non-criminal addicts should not be thrown with criminal types in penal institutions. The latter may well be cared for in penal institutions and in their own interests and that of the community segregated for as long as the law permits in each case, as the majority are incorrigible and a social menace.

5. Of the non-criminal types, markedly psychopathic cases who have shown a failure to adjust, should likewise be segregated, if possible, for lengthy periods, in suitable surroundings (not in penal institutions).

6. Hospital provision should be made for a small number of the more normal and better adjusted type of drug addicts. In other words, cases accepted for treatment and rehabilitation should be carefully selected, and if possible, given a "carte blanche" from the authorities as being non-criminals.

7. Rehabilitation should involve a lengthy period of detention after the withdrawal of their narcotics, with occupational therapy, and re-education to the fact that it is possible for them to adjust without narcotics.

8. A small number of well-adjusted drug addicts should be permitted to continue their daily dosage under proper supervision.

9. By education and proper narcotic law enforcement further cases of addiction should be prevented.

10. There is no evidence to confirm claims made that there is such a thing as a "cure" or a "specific" for drug addiction which will miraculously rid drug addicts of their drug addiction. Withdrawal of narcotics does not constitute a "cure."

11. Next to morphine, codeine is best suited to relieve the withdrawal symptoms of drug addiction.

12. The value of hypnotics in the withdrawal of narcotics is negligible in most cases, and where large amounts are used sometimes render the condition worse.

REFERENCES AND BIBLIOGRAPHY.

1. Light, A. B., and Torrance, E. G.: The Conduct of the Addict in Relation to Investigation Study, Arch. Int. Med., Feb. 1929.
2. Cotter, J. I.: Personal Communication in Reference to Statistics of Criminal Drug Addicts. In Mr. Cotter's work at the Court of Special Sessions, N. Y. C., the figures for the ages of the drug addicts agreed very closely with our own.
3. Kolb, L.: Drug Addiction in its Relation to Crime, J. Ment. Hyg., Jan. 1925, Vol. 9, No. 1, pp. 74-89.
Kolb, L.: Drug Addiction, Arch. of Neur. and Psych., July 1928, Vol. 20, pp. 171-183.
4. Pearson, C. B.: Study of Degeneracy as Seen Among Morphine Addicts, N. Y. Med. Journ., Nov. 15, 1919, 110: 805.
5. Salus, H. W.: Mystery Drug, The Med. World, Jan. 1927, p. 17.
6. Skoog, A. L.: Journ. Kansas Med. Soc., Feb. 1922, 45-48.
7. Pettey, G. E.: Narcotic Drug Diseases, 1913, p. 283.
8. Kolb, L., and DuMez, A. C.: Prevalence and Trend of Drug Addiction in the U. S. and Factors Influencing It. Reprint No. 924 from the Public Health Reports, May 23, 1924.
9. Traffic in Narcotic Drugs. Report of Special Committee of Investigation Appointed May 15, 1918 by the Secretary of the Treasury, June 1919.
10. Simon, C.: Survey of the Narcotic Problem, J. A. M. A., March 1924, 82, 675-679.
11. Menace of Morphine, Heroin and Cocaine, International Narcotic Education Society (Files of Library A. M. A.).
12. May, H. L.: Survey of Opium Smoking Conditions in the Far East—Report to the Executive Board of the Foreign Policy Association, March 1927.
12a. Davis, D., and Ayman, D.: Sublingual Absorption of Drugs, Morphine, Arch. Int. Med., 1928, 41, 231-233.
13. Rosanoff, A. J.: Manual of Psychiatry, 1927, 235-242.

14. Terry, C. E., and Pellens, M.: The Opium Problem, 1928, 517-628.
Miner, J. R.: Morphine Habit, Gradual Withdrawal Method of Treating Morphinism: A Mathematical Note, Bull. Johns Hopkins Hosp., June 1921, 32, 205.
15. Park, S.: Treatment of Narcomania, Brit. Med. Journ., Oct. 1921, 2, 563.
16. Pettey, G. E.: Narcotic Drug Diseases, 1913, 72-79.
17. Lambert, A., and Tilney, F.: The Treatment of Narcotic Addiction by Narcosan, N. Y. Med. Journ. and Rec., Dec. 1926.
18. Lambert, A.: Treatment of Drug Addiction, J. A. M. A., 1913, 40, 1933-1936.
19. Stokes, C. F.: Pathology and Treatment of Narcotic Addiction, Med. Rec., June 1917, 91, 969.
20. Sceleth, C. E.: A Treatment for Morphine Addiction, J. A. M. A., March 1915, 1927.
21. Sceleth, C. E., and Kuh, S.: Drug Addiction, J. A. M. A., March 1924, 82, 679-682.
22. Pearson, C. B.: A Study of the Etiology and Prophylaxis of Relapse in Morphinism, Med. Rec., June 1919, 95, 1047.
23. Sandoz, C. E.: Report on Morphinism to the Municipal Court of Boston, J. Crim. Law and Criminol., May 1922, 13, No. 1.
23a. Cotter, J. I.: Extract from "The Panel" published by the "Association of Grand Jurors of N. Y. County," April 1929, Vol. 7, No. 3, p. 6.
24. Rosanoff, A. J.: Manual of Psychiatry, 1927, "Honeymoon of the Morphine Addict," p. 237.
25. Light, A. B., and Torrance, E. G.: Physical Characteristics and Physical Fitness of Addicts During Administration of Morphine, Arch. of Int. Med., March 1929.
26. Osler, W., and McCrae, T.: The Principles and Practice of Medicine, 1926, p. 888, par. 2.
27. Light, A. B., and Torrance, E. G.: The Circulation and Respiration of Human Addicts During the Administration of Morphine, Arch. of Int. Med., April 1929.
28. Karr, W. G., Light, A. B., and Torrance, E. G.: The Blood of the Human Addict During the Administration of Morphine, Arch. of Int. Med., May 1929.
29. Johnson, G. S.: The Use of Narcosan in the Treatment of Drug Addiction, Colorado Med., Nov. 1927, 24, No. 11.
30. Kolb, L.: Pleasure and Deterioration from Narcotic Addiction, J. Ment. Hyg., Oct. 1925, Vol. 9, No. 4, 699-724.
31. Wholey, C. C.: The Mental and Nervous Side of Addiction to Narcotic Drugs, J. A. M. A., Aug. 1924, 83, 321-324.
32. Dowling, O.: Three Great National Health Problems, J. A. M. A., Aug. 1925, 484.
33. Bleuler, E., and Brill, A. A.: Textbook of Psychiatry, 1924, p. 175.

34. Rosanoff, A. J.: Manual of Psychiatry, 1927, pp. 186-208.
35. Krauss, R.: Morphinismus und Homosexualitat., Z'T'schr. f. v. ges. Neurol. u. Psychiat., 1926, 101, 271-277.
36. Osborne, O. T., and Fishbein, M.: Handbook of Therapy, A. M. A., 1923, pp. 445-455.
37. Pellini, E. J., and Greenfield, A. D.: Narcotic Drug Addiction, 1. Formation of Protective Substances Against Morphine, Arch. of Int. Med., Sept. 1920, 26, No. 3, 279.
38. Bishop, E. S.: The Narcotic Drug Problem, 1921, pp. 41-45.
39. Plant, O. H., and Pierce, I. H.: Studies in Chronic Morphine Poisoning in Dogs, 1. General Symptoms and Behavior During Addiction and Withdrawal, J. of Pharm. and Experim. Therap., 1928, 33, 371.
40. Fishman, J. F.: Report to Richard C. Patterson, Jr., Commissioner of Correction, N. Y. C., on the Narcosan Treatment at Correction Hospital, Welfare Island, June 8, 1928.
41. Nellans, C. T., and Massee, J. C.: Management of Drug Addicts in U. S. Penitentiary at Atlanta, J. A. M. A., Jan. 1929, 14, Vol. 92, p. 1153.
42. Same as (29).
43. Terry, C. E., and Pellens, M.: The Opium Problem, 1928, p. 555.
44. Pettey, G. E.: The Treatment of Drug Addiction, J. A. M. A., March 20, 1915, p. 1022.
45. Same as (43).
46. Neuwirth, I., and Wallace, G. B.: On the Use of Magnesium as an Aid in Anesthesia, J. of Pharm. and Experim. Therap., Feb. 1929, Vol. 35, No. 2, pp. 171-176.
47. Solis-Cohen, S. and Githens, T. S.: Pharmacotherapeutics, Materia Medica and Drug Action, 1928, 1723.
48. Zerfas, L. G., and McCallum, J. T. C.: The Analgesic and Anesthesic Property of Sodium Iso-Amylethyl Barbiturate, J. of Ind. State Med. Assoc., Feb. 1929, 22, 47-50.
49. Ashworth, W. C.: More Satisfactory Treatment for Narcotic Drug Habituation, Virg. Med. Month., Aug. 1925, p. 303.
50. Goetz, H. E.: Treatment of Morphine Habit, J. A. M. A., Jan. 1915, p. 190.
51. Bauguss, J. B.: Drug Addiction (Extract from the files on Drug Addiction of the Library of the J. A. M. A.).
52. Terry, C. E., and Pellens, M.: The Opium Problem, 1928, p. 525.
53. Brown, L. M.: Drug Addiction (Narcotic Files of library of J. A. M. A.).
54. Bluemel, C. S.: New Treatment for the Morphine Habit, J. A. M. A., 1919, 72, 552.
55. Philips, P. T.: Narcotics, Calif. and West. Med., May 1928, Vol. 28, No. 5.
56. Scott, G. L.: Treatment of Morphinism, British Med. Journ., Nov. 1927, 2, 827.

57. Extension of Remarks of the Hon. F. Lineberger of California, in the House of Representatives, Feb. 18, 1925. (From the Narcotic Files of the Library of the J. A. M. A.)
58. Narcotic Problem, Special Bulletin of the Chicago Medical Society, March 5, 1924, p. 27.
59. St. Antoine, H. E.: Drug Addiction (Narcotic Files of the Library J. A. M. A.).
60. McConnely, E.: Care and Treatment of Drug Addiction (Narcotic Files of Library J. A. M. A.).
61. Sceleth, C. E.: What We Believe to be Facts Concerning Drug Addicts, Ill. Med. Journ., July 1924, p. 70.
62. Church, A., and Peterson, F.: Nervous and Mental Diseases, 1925, pp. 723-725.
63. Bleuler, E., and Brill, A. A.: Textbook of Psychiatry, 1924, pp. 354-361.
64. Osler, W., and McCrae, T.: The Principles and Practice of Medicine, 1926, pp. 391-393.
65. Henderson, D. K., and Gillespie, R. O.: A Textbook of Psychiatry, 1927, pp. 280-283.
66. White, W. A.: Outlines of Psychiatry, 1926, pp. 280-284.
67. Dawson, W. S.: Aids to Psychiatry, 1924, pp. 156-161.
68. Graham-Mulhall, S.: Opium, The Demon Flower, 1928.

Association and Hospital Notes and News.

MEETING OF THE ASSOCIATION FOR RESEARCH IN MENTAL AND NERVOUS DISEASE.—The eleventh annual meeting of the Association for Research in Nervous and Mental Disease will be held on Monday and Tuesday, December 29 and 30, 1930.

The headquarters of the Association will be as usual, at the Commodore Hotel, 42d Street and Lexington Avenue, and the sessions will be held in the rooms which have been engaged by the Association in the past.

The meeting will consist of morning and afternoon sessions, the former being called to order at 9.15 a. m. and the latter at 2.30 p. m.

The 1930 meeting will be devoted to a consideration of the " Manic Depressive Psychosis " and the program has been arranged by Dr. William A. White, Director of St. Elizabeth's Hospital, Washington, D. C.

The final program will be composed of papers selected from the following list of contributions:

1. *Historical.*—History of the Manic-Depressive Reaction Types. Smith Ely Jelliffe, M. D., New York.

2. *Constitution.*—Organic Constitution of the Cyclothymic. Walter Freeman, M. D., Washington. Build in Manic-Depressive Psychosis. Horace Gray, M. D., San Francisco.

3. *Childhood Reactions.*—Mental and Health Factors in Juvenile Cases of Manic-Depressive Psychoses. Albert M. Barrett, M. D., Ann Arbor, Mich. Personality Patterns in Children in Families with Manic-Depressive Psychosis in the Direct Line. Lawson G. Lowrey, M. D. The Behavior Problem in Childhood. M. G. Peterman, M. D., Milwaukee, Wis. The Affective Psychoses in Children. J. Kasanin, M. D., Boston. The Rorschach Test in Manic-Depressive Psychosis, David M. Levy, M. D., New York.

4. *Etiology.*—A Study of Psychogenic Factors as Causative Agents in Manic-Depressive Attacks. Clarence A. Bonner, M. D., Hathorne, Mass.

5. *Pathology.*—Somatic Expressions in Manic-Depressive Psychoses. Nolan D. C. Lewis, M. D., Washington.

6. *Symptomatology.*—Studies on the Blood Cerebrospinal Fluid Barrier in Manic-Depressive Psychosis. William Malamud, M. D., Iowa City, Iowa. David Rothschild, M. D., Foxborough, Mass. Physico-Chemical Changes of

the Blood Serum and Different Phases of the Manic-Depressive Psychosis. S. DeW. Ludlum, M. D., Gladwyne, Pa.

Contributions to the Laboratory Study of Manic-Depressive Psychosis. 1. Basal Metabolism and the specific dynamic factor of protein; indices of water metabolism; acid-base equilibrum; blood sugar curves as affected by emotion; gastric secretion and mobility; anthropometry. Clifford B. Farr, M. D., Philadelphia. Kenneth E. Appel, M. D., Philadelphia. 2. Pharmacodynamic Tests with special reference to Histamine. Norvelle C. La Mar, M. D., Philadelphia. Harold D. Palmer, M. D., Philadelphia. 3. Psychogalvanometer Readings. Edward M. Westburgh, M. D., Philadelphia. Elmer V. Eyman, M. D., Philadelphia. 4. Discussion. Earl D. Bond, M. D., Philadelphia.

Gastrointestinal Motor Functions in Manic-Depressive Psychoses-Roentgenologic Observations. George W. Henry, M. D., White Plains, New York. Physiological Periodicities and Their Relation to Manic-Depressive Cycles. Curt P. Richter, Ph. D., Baltimore, Md. Recurrence and Duratioin of Attacks in Manic-Depressive Psychoses. Horatio M. Pollock, Ph. D., Albany, N. Y. The Motility in Manic-Depressive Psychosis. Paul Schilder, M. D., New York. Delusions and Hallucinations in Manic-Depressive Psychoses. Karl M. Bowman, M. D., Boston. An Empirical Determination of the Association of Symptoms in the Manic-Depressive Psychoses. Thomas V. Moore, M. D., Washington.

7. *Borderland Symptomatology.*—The Significance of Schizoid Mechanisms in the Manic-Depressive Syndrome. Chester L. Carlisle, M. D., New York. Relation of Other Reaction Types to Manic-Depressive. Lucile Dooley, M. D., Washington.

8. *Mechanisms.*—Socialization and Compensation in Manic-Depressive Psychosis. Leland E. Hinsie, M. D., New York.

9. *Statistical.*—Manic-Depressive Psychoses Among Ex-Service Men. Philip B. Matz, M. D., Washington. O. C. Willhite, M. D., Washington.

10. *Psychology.*—Personality and the Concept "Manic-Depressive Psychosis." G. E. Partridge, Ph. D., Towson, Md. Intellectual Deterioration in Manic-Depressive Psychosis. George Van Ness Dearborn, M. D., New York. The Psychodynamics of Depressive Reactions to Parenthood. Gregory Zilboorg, M. D., White Plains, N. Y. Psychoanalytic Sidelights on the Manic-Depressive Reactions. C. P. Oberndorf, M. D., New York. Monroe A. Meyer, M.D., New York.

11. *Ethnography.*—Manic-Depressive Reaction in the Negro. Nolan D. C. Lewis, M. D., Washington. Elizabeth R. Vann, M. D., Washington.

12. *Prognosis.*—The Prognosis in Manic-Depressive Psychoses. Edward A. Strecker, M. D., Philadelphia. The Mechanisms and the Prognostic Aspects of the Manic-Depressive Schizophrenic Combination. Nolan D. C. Lewis, M. D., Washington. Lois D. Hubbard, M. D., Washington.

13. *Medico-Legal Aspects.*—Manic-Depressive Psychoses—Their Medico-Legal Implications. Theophile Raphael, M. D., Detroit.

14. *Treatment.*—Treatment of Manic-Depressive Psychosis. Survey of the Literature. Leland E. Hinsie, M. D., New York. Siegfried E. Katz, M. D., New York. Results Obtained by the Use of Sodium Bromide in the Treatment of Depressions of the Manic-Depressive Type. William W. Wright, M. D., Utica, N. Y. Solution of Manic-Depressive Psychosis Through Energy Direction. Anita M. Mühl, M. D., San Diego, Cal. Psychotherapeutic Studies in Manic-Depressive Psychoses. Nolan D. C. Lewis, M. D., Washington. Changes in Mood and in Mental and Motor Control in Normal Subjects Following Massive Doses of Bromides. Donald A. Laird, Ph. D., Hamilton, N. Y. The Applicability of Psycho-Analysis to the Treatment of Depressive States. Bernard Glueck, M. D., New York.

THE NATIONAL COMMITTEE FOR MENTAL HYGIENE ANNOUNCES FELLOWSHIPS FOR TRAINING IN EXTRAMURAL PSYCHIATRY.—*Minimum Requirements for Applicants.*—These fellowships are designed to provide special training for physicians who have had previous hospital training in psychiatry but who wish to prepare themselves for extramural work in the fields of child guidance, delinquency, education, dependency, and industry.

Fellowships are open to physicians who are: (1) Under thirty-five years of age. (2) Graduates of Class A medical schools. (3) Who have had at least one year of training in a hospital for mental disease maintaining satisfactory standards of clinical work and instruction. A longer period of hospital training is desirable.

Applicants able to meet these requirements will not be required to take competitive written or oral examinations. Selections will be made on the basis of length and type of previous training in formal psychiatry; on general fitness for the work contemplated; and (in most cases) on the results of a personal interview.

General Details of Fellowships.—(1) These fellowships cover a period of training approximately one year in length. (2) During this training period trainees usually are assigned for three to four months' periods at such places as the Boston Psychopathic Hospital; Judge Baker Foundation, Boston; Institute for Juvenile Research, Chicago, and other places of a similar nature, as well as to various child guidance clinics located in Cleveland, Philadelphia and other cities. Assignments to these training centers are not definite, however, and assignment to any given place will depend upon the availability of instruction at such place, as well as the special needs of the individual trainee. Assignments are not made for more than three months in advance, and adherence for the year's training

period to a fixed program in advance is impossible. (3) These fellowships carry stipends at the rate of $2000 to $2500 for the twelve months' period. (4) Applications need not be filed within stated periods but will be received at any time. In the case of successful applicants, arrangements will be made to begin work whenever mutually convenient to the applicant and to the director of the training center to which the applicant is first assigned.

Applications or inquiries for further information should be sent to Dr. Frankwood E. Williams, Medical Director, National Committee for Mental Hygiene, 370 Seventh Avenue, New York, N. Y.

RETIREMENT OF DR. HENRY A. COTTON, AND FUTURE PLANS.—On October 1, 1930, Dr. Henry A. Cotton, the Medical Director of the N. J. State Hospital at Trenton for the past 23 years, was at his own request relieved of the executive work of the State Hospital. The Board of Managers made him Medical Director Emeritus and appointed him Director of Research.

The Board appointed Dr. Robert G. Stone his successor as Medical Director. Dr. Stone has been connected with the hospital for 11½ years and for the last 5 years has been Assistant Medical Director. He is well grounded in and capable of carrying on the methods developed by his predecessor.

Dr. Cotton will devote his time to research in both the clinical and pathological fields. He will also give considerable time to the problems of prevention. Dr. Cotton will soon move to Princeton and occupy his home purchased some time ago.

OFFICERS OF THE AMERICAN PSYCHIATRIC ASSOCIATION, 1930-31:

William M. English, M. D., President.....Brockville, Ont.
William L. Russell, M. D., Vice President.....White Plains, N. Y.
Clarence O. Cheney, M. D., Secretary-Treasurer.....Poughkeepsie, N. Y.

COUNCILLORS.

FOR THREE YEARS.

Earl D. Bond, M. D.....Philadelphia, Pa.
Glenn E. Myers, M. D.....Los Angeles, Cal.
Horace G. Ripley, M. D.....Brattleboro, Vt.
Robert L. Dixon, M. D.....Lapeer, Mich.

FOR TWO YEARS.

Samuel T. Orton, M. D.....New York, N. Y.
Malcolm A. Bliss, M. D.....St. Louis, Mo.
Frank W. Robertson, M. D.....Stamford, Conn.
N. M. Owensby, M. D.....Atlanta, Ga.

FOR ONE YEAR.

Adolf Meyer, M. D.....Baltimore, Md.
Henry I. Klopp, M. D.....Allentown, Pa.
Arthur F. Kilbourne, M. D.....Rochester, Minn.
Ross McC. Chapman, M. D.....Towson, Md.

AUDITORS.

FOR THREE YEARS.

L. V. Guthrie, M. D.*.....Huntington, W. Va.

FOR TWO YEARS.

Marcus A. Curry, M. D.....Greystone Park, N. J.

FOR ONE YEAR.

F. A. Carmichael, M. D.....Osawatomie, Kans.

EXECUTIVE COMMITTEE.

W. M. English, M. D.....Brockville, Ont.
William L. Russell, M. D.....White Plains, N. Y.
Henry I. Klopp, M. D.....Allentown, Pa.
Ross McC. Chapman, M. D.....Towson, Md.
Clarence O. Cheney, M. D.....Poughkeepsie, N. Y.

COMMITTEE ON PROGRAM.

FOR ONE YEAR.

Samuel W. Hamilton, M. D., Chairman 1930-31.....White Plains, N. Y.
Douglas A. Thom, M. D.....Boston, Mass.

FOR TWO YEARS.

Harry C. Solomon, M. D.....Boston, Mass.
George H. Kirby, M. D.....New York, N. Y.

FOR THREE YEARS.

Lawson G. Lowrey, M. D.....New York, N. Y.
G. Kirby Collier, M. D., Vice-Chairman, 1930-31.....Rochester, N. Y.

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* Deceased.

FOR FOUR YEARS.

Franklin G. Ebaugh, M. D.....Denver, Colo.
Theophile Raphael, M. D.....Detroit, Mich.

FOR FIVE YEARS.

William Malamud, M. D.....Iowa City, Iowa
Alvin T. Mathers, M. D.....Winnipeg, Man.

COMMITTEE ON ARRANGEMENTS.

Hugh A. McKay, M. D., Chairman.....Mimico, Ont.
C. M. Hincks, M. D.....Toronto, Ont.
Clarence B. Farrar, M. D.....Toronto, Ont.
George H. Stevenson, M. D.....Whitby, Ont.
Nelson H. Beemer, M. D.....Toronto, Ont.
W. K. Ross, M. D.....Toronto, Ont.
Bernard T. McGhie, M. D.....Orillia, Ont.
J. J. Williams, M. D.....Hamilton, Ont.
Donald R. Fletcher, M. D.....Toronto, Ont.
E. P. Lewis, M. D.....Toronto, Ont.

COMMITTEE ON PUBLICITY.

FOR ONE YEAR.

George K. Pratt, M. D., Chairman, 1930-31.....New York, N. Y.

FOR TWO YEARS.

A. S. Hamilton, M. D.....Minneapolis, Minn.

FOR THREE YEARS.

Roger C. Swint, M. D.....Milledgeville, Ga.

FOR FOUR YEARS.

Clarence A. Bonner, M. D.....Hawthorne, Mass.

FOR FIVE YEARS.

George H. Stevenson, M. D.....Whitby, Ont.

COMMITTEE ON RESEARCH.

FOR FOUR YEARS.

John C. Whitehorn, M. D., Chairman, 1930-31.....Waverly, Mass.

FOR THREE YEARS.

Hugo Mella, M. D.....Palo Alto, Cal.

FOR TWO YEARS.

Albert M. Barrett, M. D.....Ann Arbor, Mich.

FOR ONE YEAR.

Henry A. Bunker, Jr., M. D.....New York, N. Y.

FOR FIVE YEARS.

Charles E. Gibbs, M. D.....Kings Park, N. Y.

COMMITTEE ON STATISTICS.

FOR ONE YEAR.

James V. May, M. D., Chairman, 1930-31.....Boston, Mass.
Albert M. Barrett, M. D., Vice-Chairman, 1930-31.....Ann Arbor, Mich.

FOR FIVE YEARS.

George H. Kirby, M. D.....New York, N. Y.
Frankwood E. Williams, M. D.....New York, N. Y.

FOR FOUR YEARS.

C. MacFie Campbell, M. D.....Boston, Mass.
Walter L. Treadway, M. D.....Washington, D. C.

FOR TWO YEARS.

Phyllis Greenacre, M. D.....White Plains, N. Y.
William T. Shanahan, M. D.....Sonyea, N. Y.

FOR THREE YEARS.

E. Stanley Abbott, M. D.....Boston, Mass.
Sanger Brown, II, M. D.....Albany, N. Y.

COMMITTEE ON NURSING.

FOR FOUR YEARS.

Daniel H. Fuller, M. D., Chairman, 1930-31.....Philadelphia, Pa.
Ross McC. Chapman, M. D.....Towson, Md.

FOR THREE YEARS.

Mortimer W. Raynor, M. D.....White Plains, N. Y.
Morgan B. Hodskins, M. D.....Palmer, Mass.

FOR TWO YEARS.

Albert Anderson, M. D.....Raleigh, N. C.
E. H. Cohoon, M. D.....Harding, Mass.

FOR ONE YEAR.

Roger C. Swint, M. D.....Milledgeville, Ga.
Ralph T. Hinton, M. D.....Elgin, Ill.

FOR FIVE YEARS.

Henry I. Klopp, M. D.....Allentown, Pa.
Arthur P. Noyes, M. D.....Howard, R. I.

COMMITTEE ON STANDARDS AND POLICIES.

FOR FOUR YEARS.

Albert C. Buckley, M. D., Chairman, 1930-31.....Philadelphia, Pa.

FOR THREE YEARS.

William L. Russell, M. D.....White Plains, N. Y.

FOR TWO YEARS.

William A. Bryan, M. D.....Worcester, Mass.

FOR ONE YEAR.

George H. Kirby, M. D.....New York, N. Y.

FOR FIVE YEARS.

Clarence B. Farrar, M. D.....Toronto, Ont.

COMMITTEE ON ETHICS.

FOR TWO YEARS.

Albert M. Barrett, M. D., Chairman, 1930-31.....Ann Arbor, Mich.

FOR ONE YEAR.

George A. Johns, M. D.....St. Joseph, Mo.

FOR FIVE YEARS.

Edward N. Brush, M. D.....Baltimore, Md.

FOR FOUR YEARS.

George S. Adams, M. D.....Yankton, S. D.

FOR THREE YEARS.

George H. Kirby, M. D.....New York, N. Y.

COMMITTEE ON LEGAL ASPECTS OF PSYCHIATRY.

For Three Years.

George M. Kline, M. D., Chairman, 1930-31.....Boston, Mass.
L. Vernon Briggs, M. D.....Boston, Mass.

For Two Years.

Karl A. Menninger, M. D.....Topeka, Kan.
William A. White, M. D., Vice-Chairman, 1930-31.....Washington, D. C.

For One Year.

Frankwood E. Williams, M. D.....New York, N. Y.
Herman M. Adler, M. D.....Santa Barbara, Cal.

For Five Years.

Winfred Overholser, M. D.....Boston, Mass.
Raymond F. C. Kieb, M. D.....Albany, N. Y.

For Four Years.

Bernard Glueck, M. D.....Ossining, N. Y.
William Healey, M. D.....Boston, Mass.

COMMITTEE ON MEDICAL SERVICES.

For Two Years.

William C. Sandy, M. D., Chairman, 1930-31.....Harrisburg, Pa.
Mortimer W. Raynor, M. D., Vice-Chairman, 1930-31...White Plains, N. Y.

For Three Years.

Edward A. Strecker, M. D.....Philadelphia, Pa.
Lloyd J. Thompson, M. D.....New Haven, Conn.

For One Year.

William Rush Dunton, M. D.....Catonsville, Md.
G. Kirby Collier, M. D.....Rochester, N. Y.

For Five Years.

Isaac J. Furman, M. D.....New York, N. Y.
Ransom A. Greene, M. D.....Waverly, Mass.

For Four Years.

Frederick W. Parsons, M. D.....Albany, N. Y.
Karl M. Bowman, M. D.....Boston, Mass.

COMMITTEE ON RELATIONS WITH SOCIAL SCIENCES.

For Four Years.

William A. White, M. D., Chairman, 1930-31.....Washington, D. C.

For One Year.

Henry Stack Sullivan, M. D., Secretary.....Towson, Md.

For Three Years.

Arthur H. Ruggles, M. D.....Providence, R. I.

For Two Years.

George M. Kline, M. D.....Boston, Mass.

For Five Years.

Bernard Glueck, M. D.....Ossining, N. Y.

COMMITTEE ON PSYCHIATRIC SOCIAL SERVICE.

For Four Years.

Karl M. Bowman, M. D., Chairman, 1930-31.....Boston, Mass.

For Three Years.

George S. Stevenson, M. D.....New York, N. Y.

For Two Years.

J. Allen Jackson, M. D.....Danville, Pa.

For One Year.

Guy Payne, M. D.....Cedar Grove, N. J.

For Five Years.

George M. Kline, M. D.....Boston, Mass.

COMMITTEE ON ACTIVITIES OF THE NEUROPSYCHIATRIC DIVISION OF THE VETERANS' BUREAU.

Glenn E. Myers, M. D., Chairman, 1930-31.....Los Angeles, Cal.
George M. Kline, M. D.....Boston, Mass.
Albert M. Barrett, M. D.....Ann Arbor, Mich.

COMMITTEE ON GRADUATE EDUCATION IN PSYCHIATRY.

Adolf Meyer, M. D., Chairman.....Baltimore, Md.
George H. Kirby, M. D.....New York, N. Y.
Edward A. Strecker, M. D.....Philadelphia, Pa.

FELLOWS DESIGNATED TO FORM A JOINT COMMITTEE ON UNDER-GRADUATE PSYCHIATRIC EDUCATION.

Albert M. Barrett, M. D.....Ann Arbor, Mich.
Lawson G. Lowrey, M. D.....New York, N. Y.
Franklin G. Ebaugh, M. D.....Denver, Colo.
Harry S. Sullivan, M. D.....Towson, Md.
Louis Casamajor, M. D., Alternate.....New York, N. Y.

SECTION ON CONVULSIVE DISORDERS.

D. S. Renner, M. D., Chairman.....Skillman, N. J.
M. B. Hodskins, M. D., Secretary.....Palmer, Mass.

MASSACHUSETTS PSYCHIATRIC SOCIETY.

(District Organization of the American Psychiatric Association.)

L. Vernon Briggs, M. D., President.....Boston, Mass.
George L. Wallace, M. D., Vice-President.....Wrentham, Mass.
Winfred Overholser, M. D., Secretary.....Boston, Mass.